SCIENCE a modern approach

SCIENCE a modern approach 2

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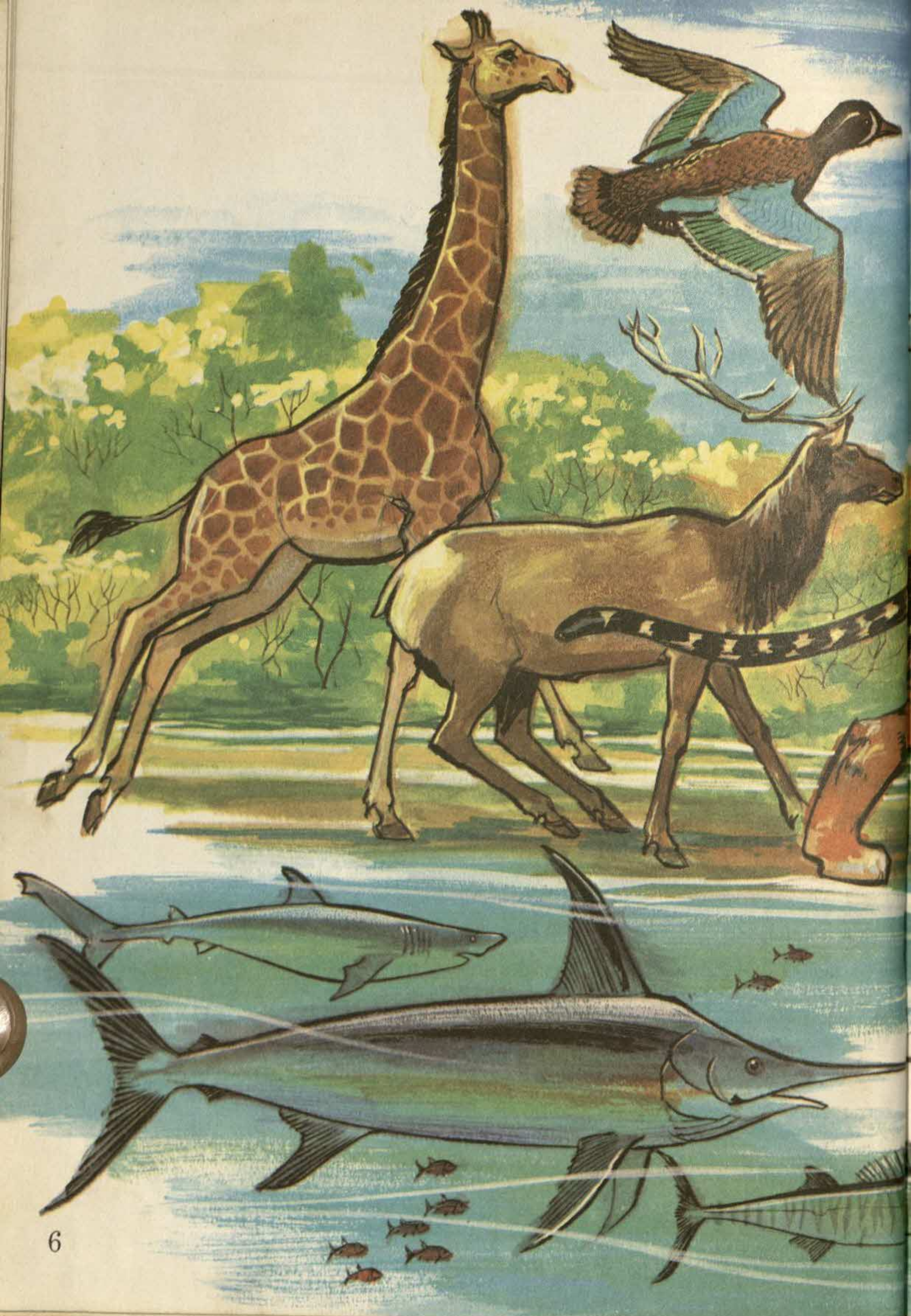
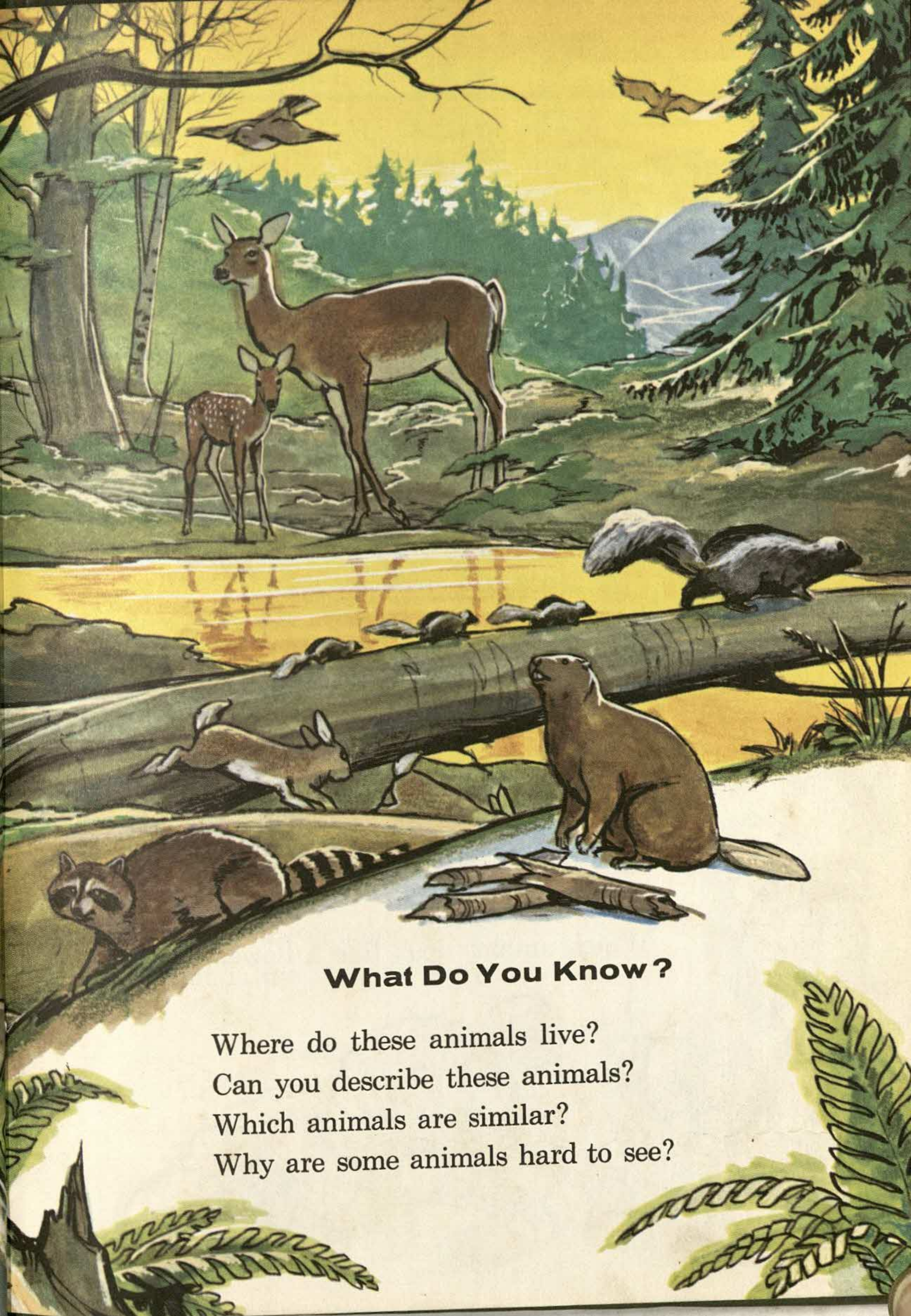
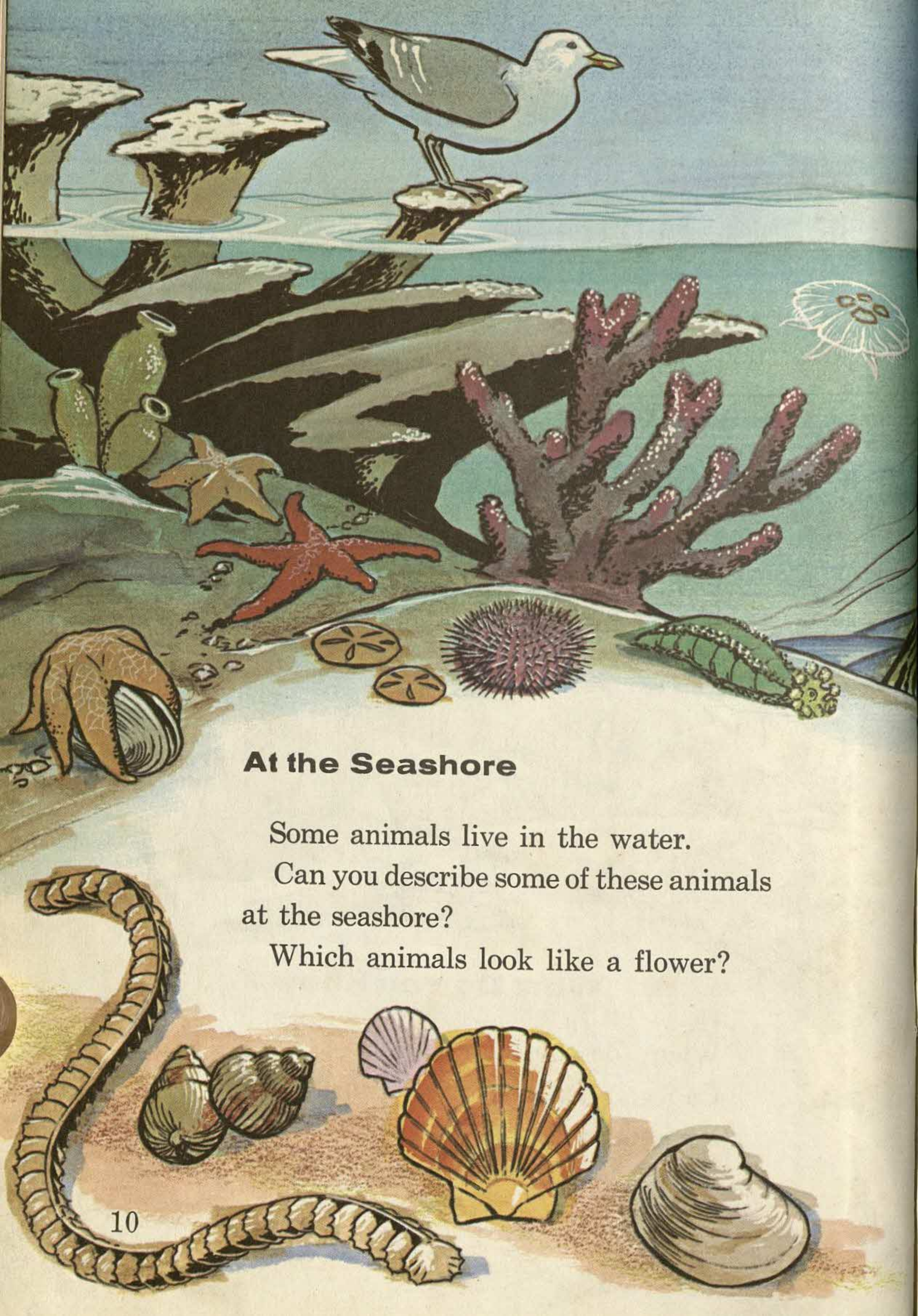


Animals



What Do You Know?

Where do these animals live?
Can you describe these animals?
Which animals are similar?
Why are some animals hard to see?

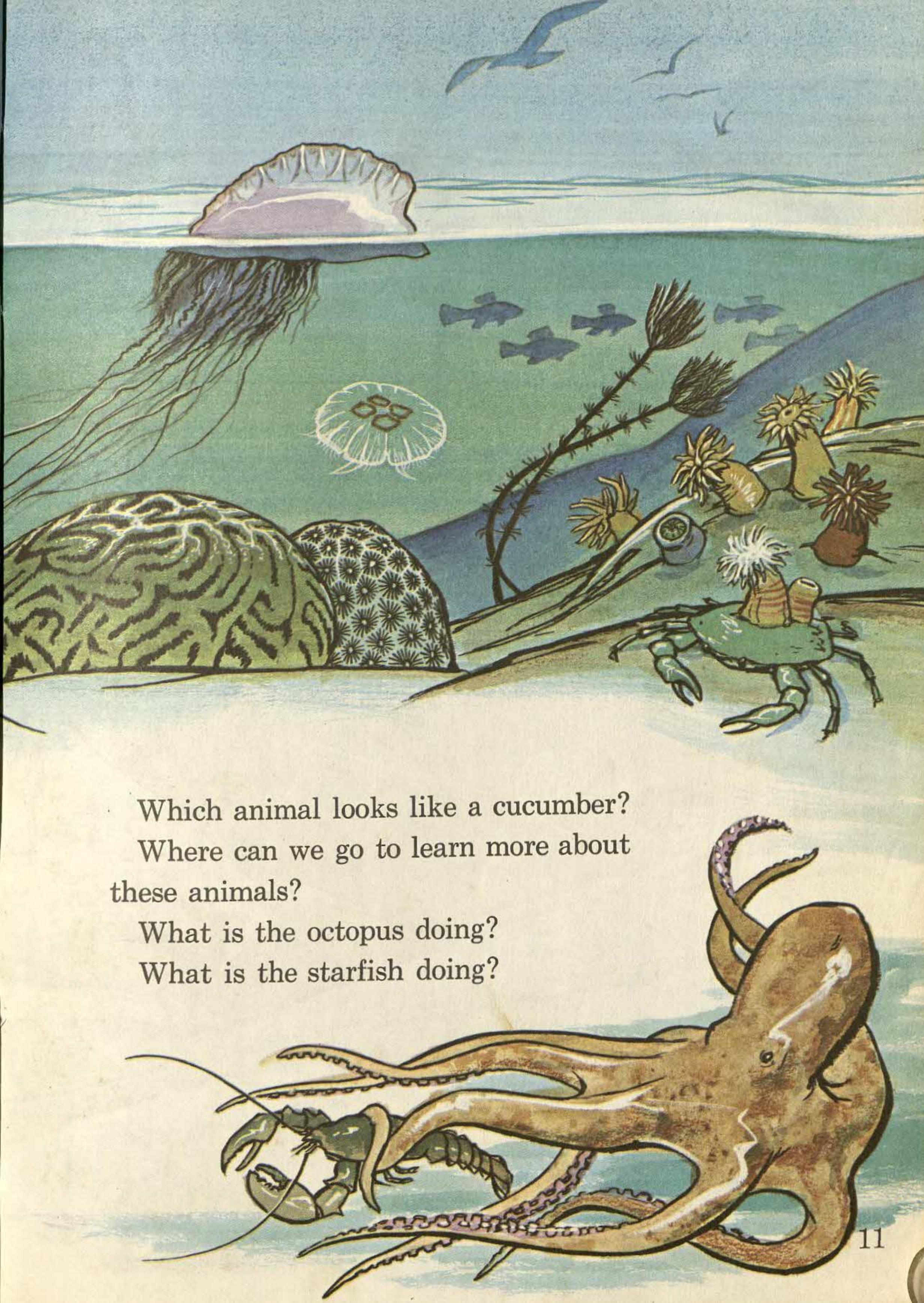


At the Seashore

Some animals live in the water.

Can you describe some of these animals at the seashore?

Which animals look like a flower?

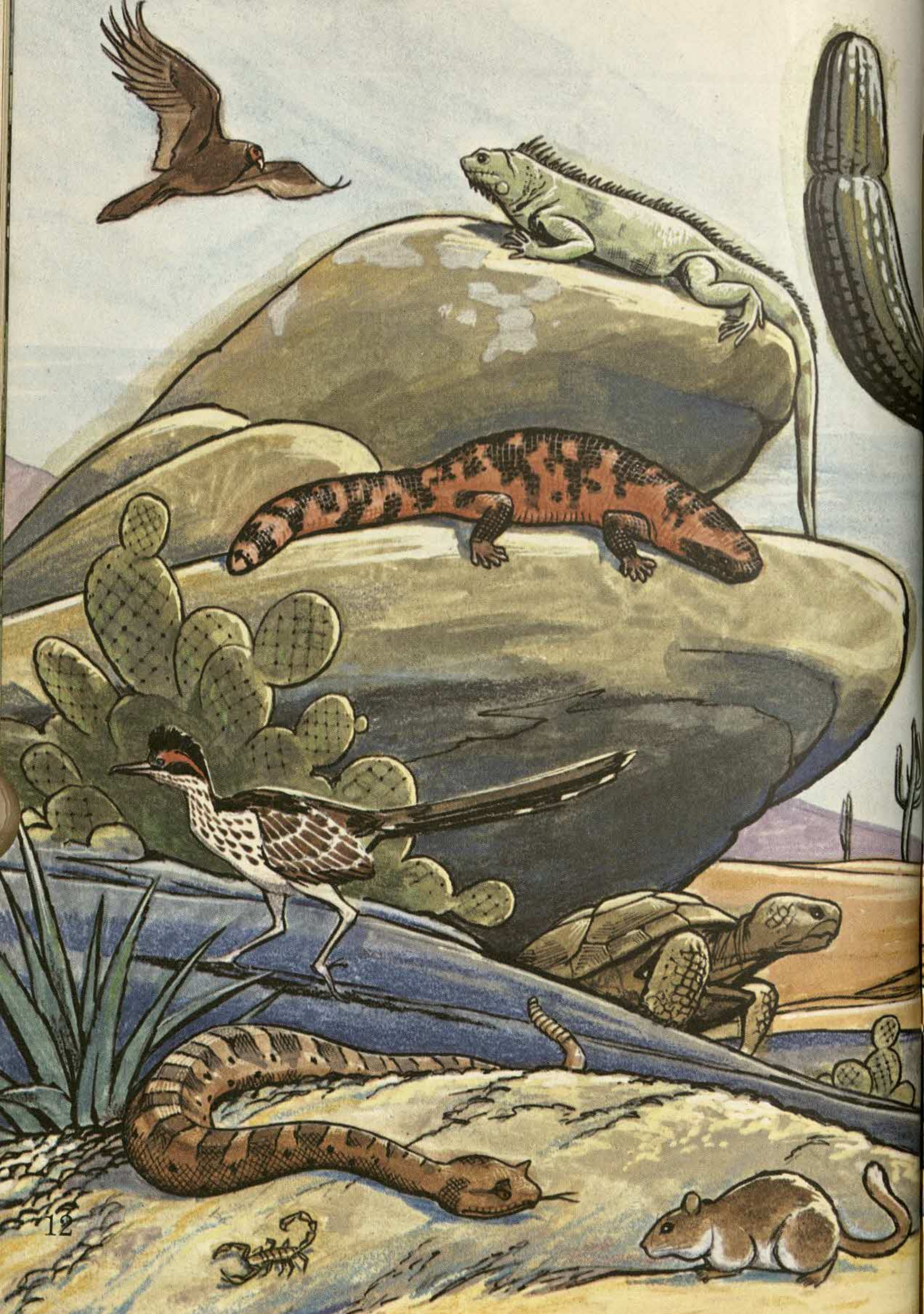


Which animal looks like a cucumber?

Where can we go to learn more about these animals?

What is the octopus doing?

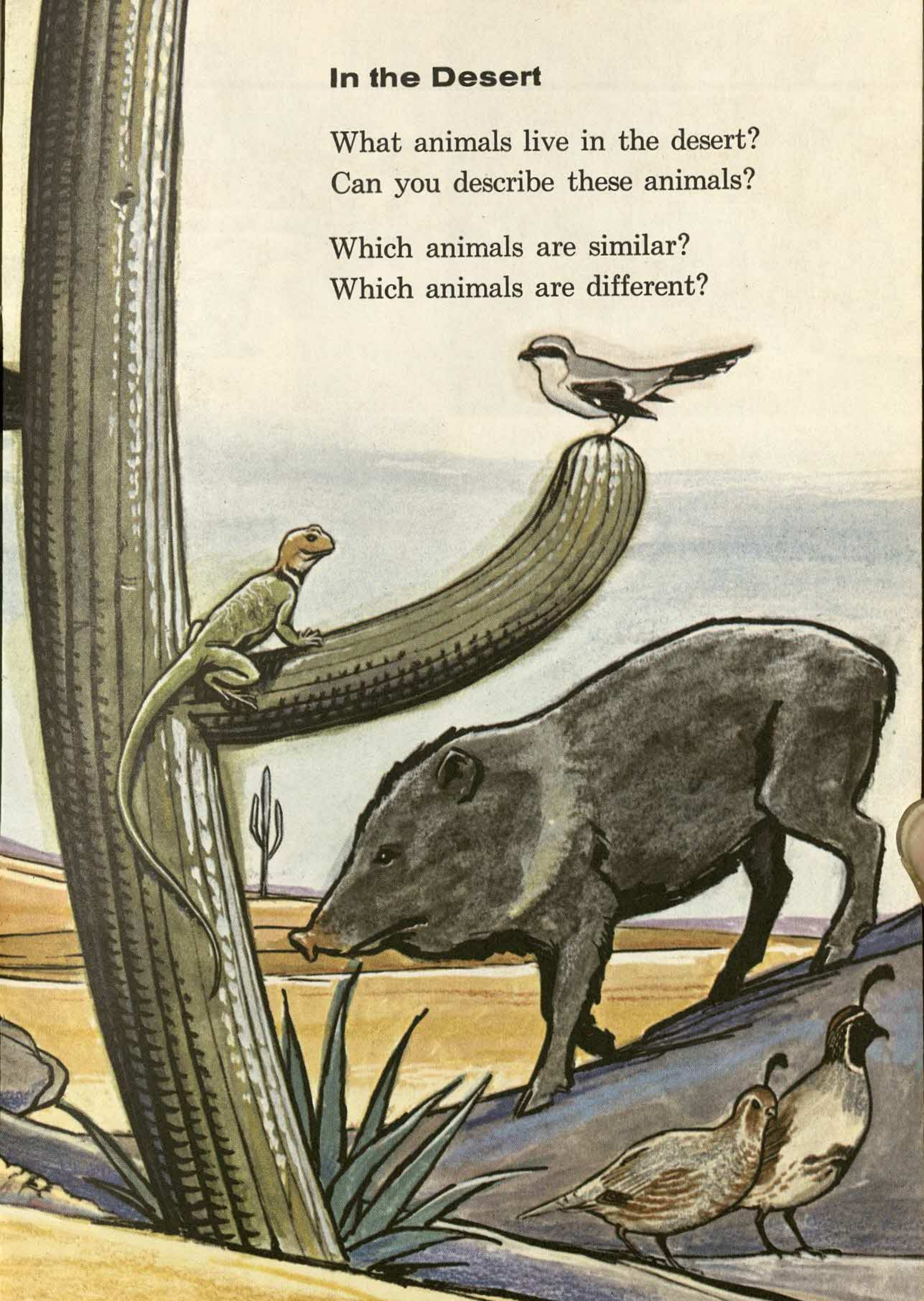
What is the starfish doing?

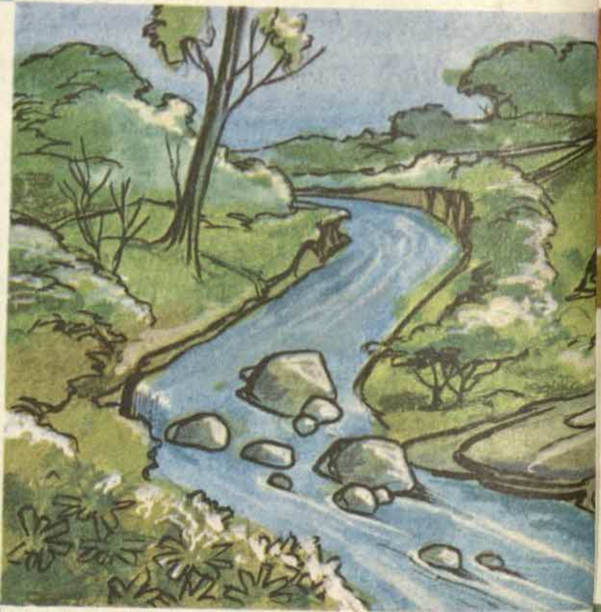


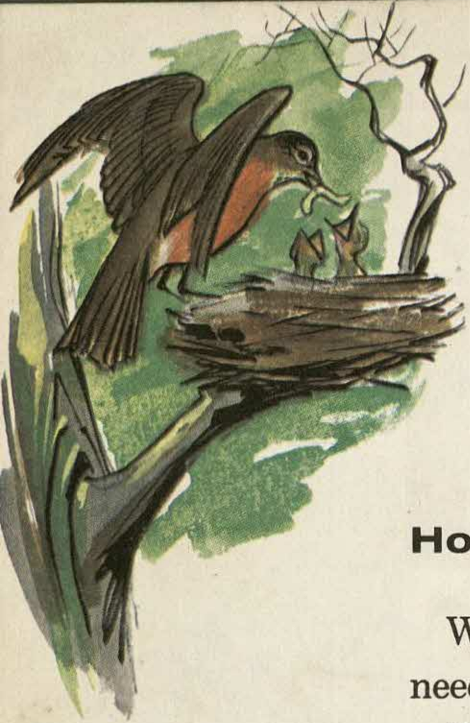
In the Desert

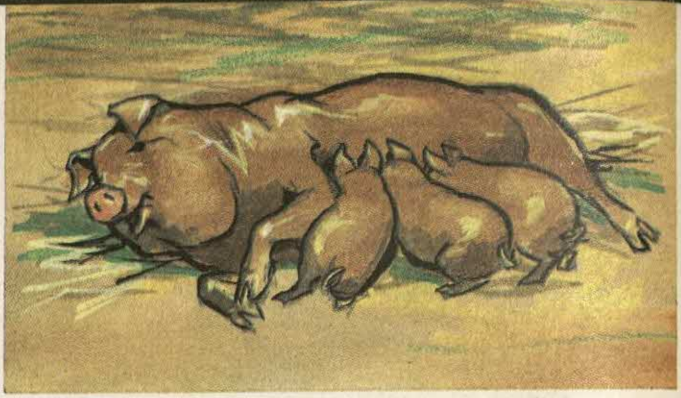
What animals live in the desert?
Can you describe these animals?

Which animals are similar?
Which animals are different?





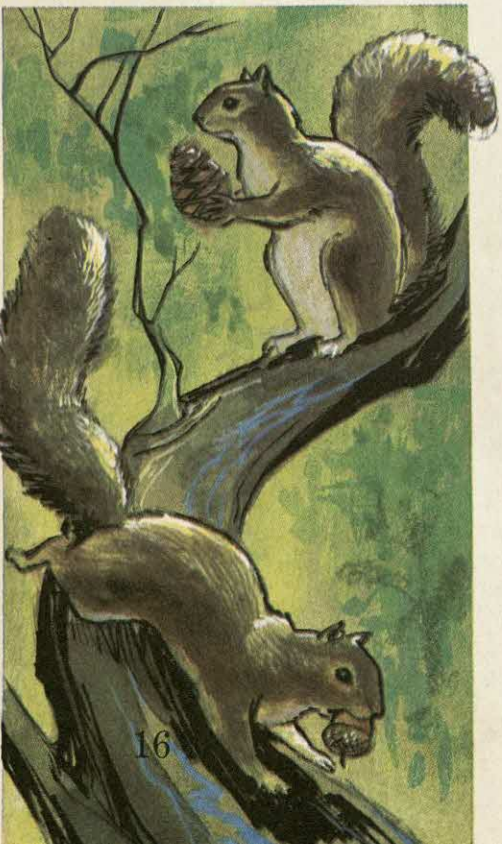


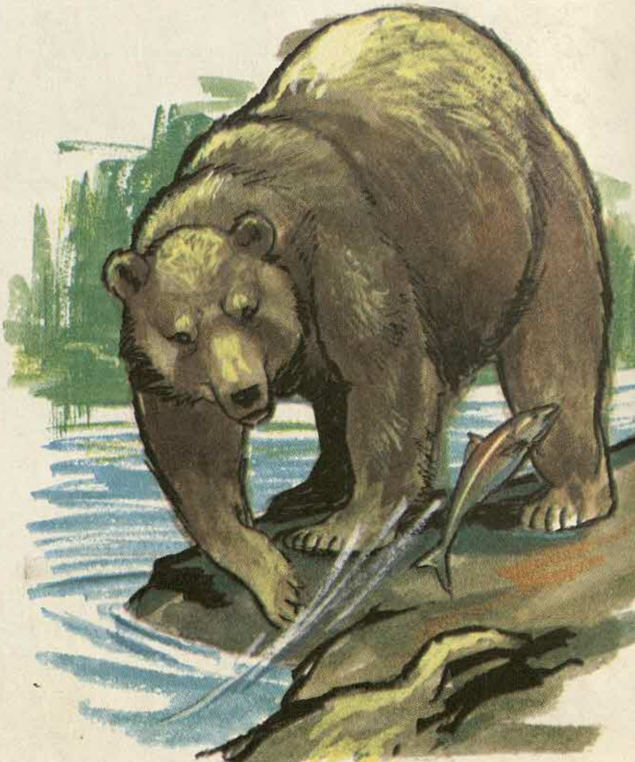


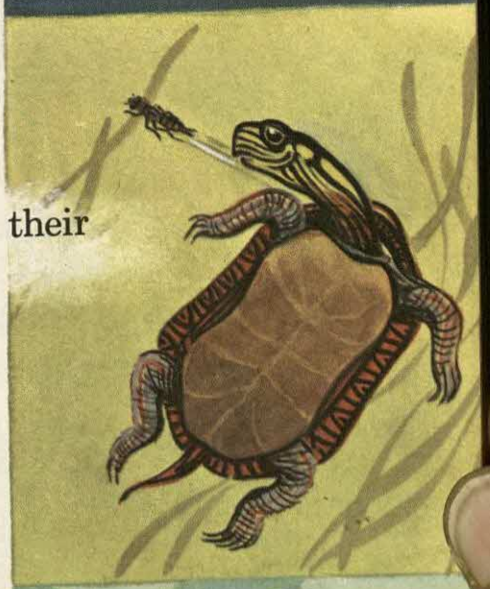
How Do They Live?

What things do you think animals need to live?

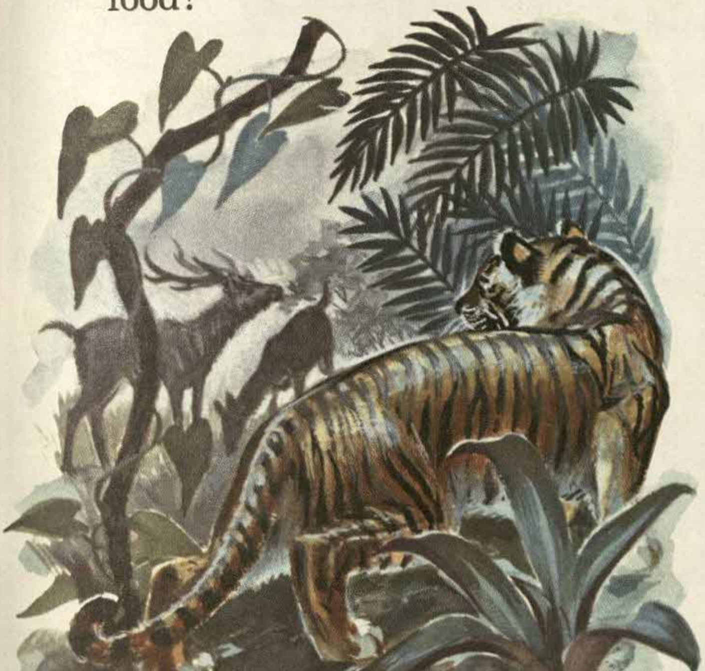
What are the animals in the pictures doing?

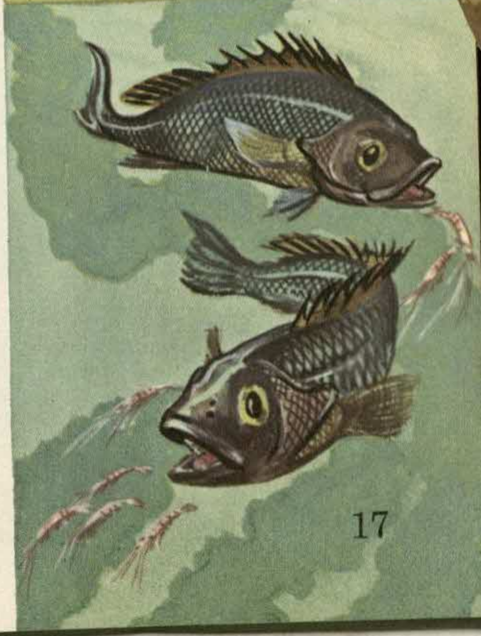


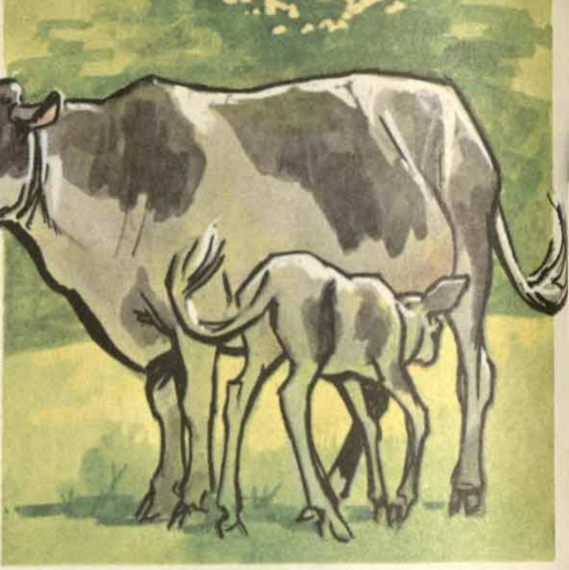




How do different animals get their food?

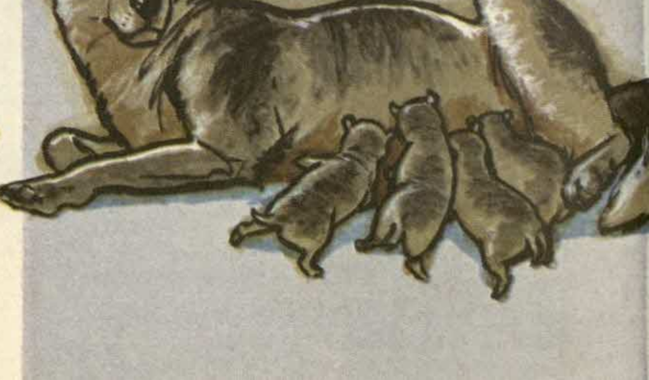


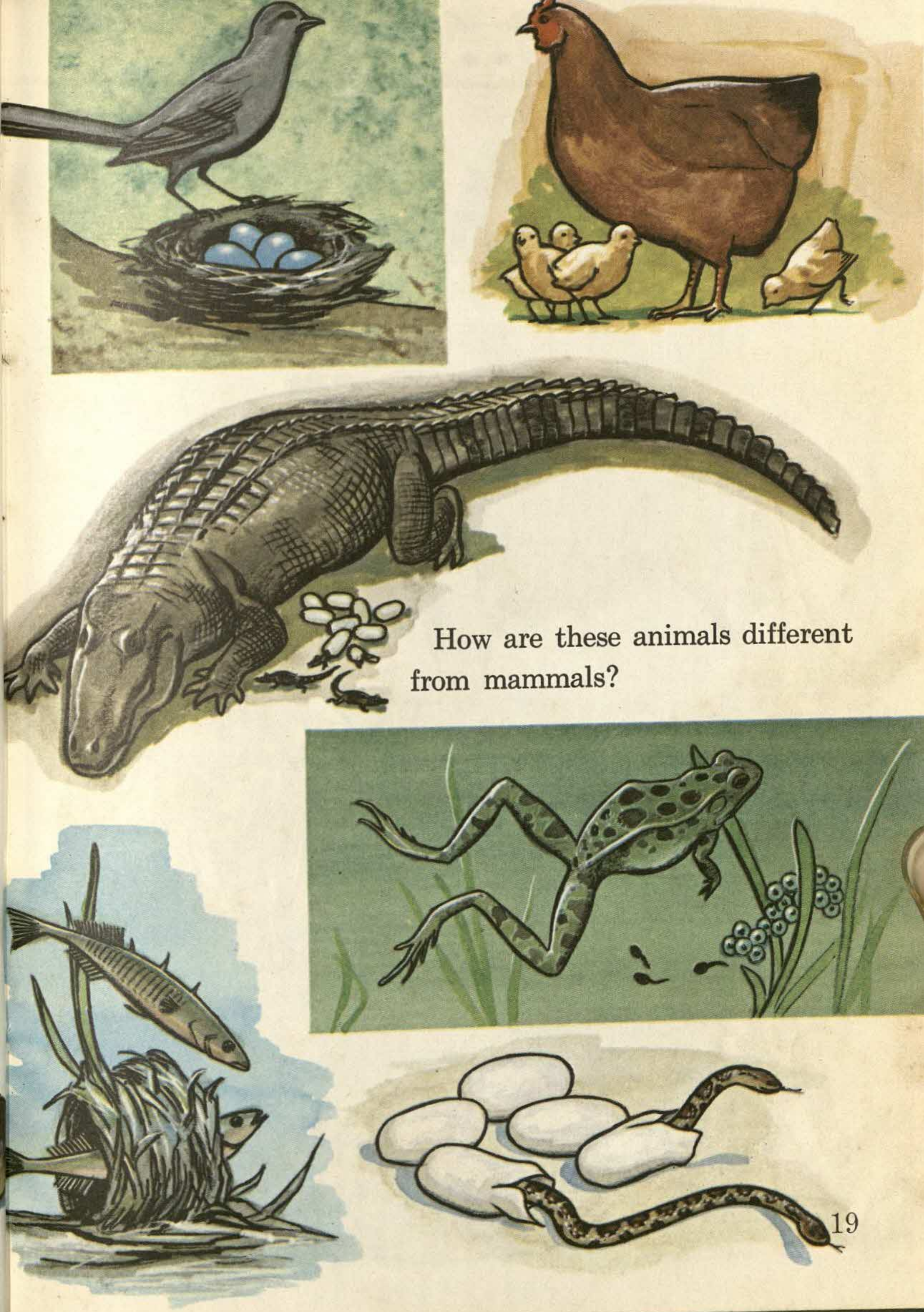




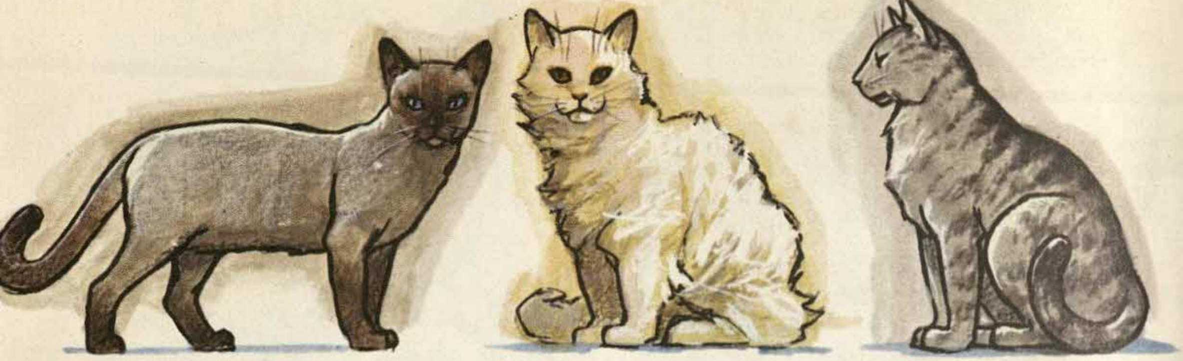
Mammals

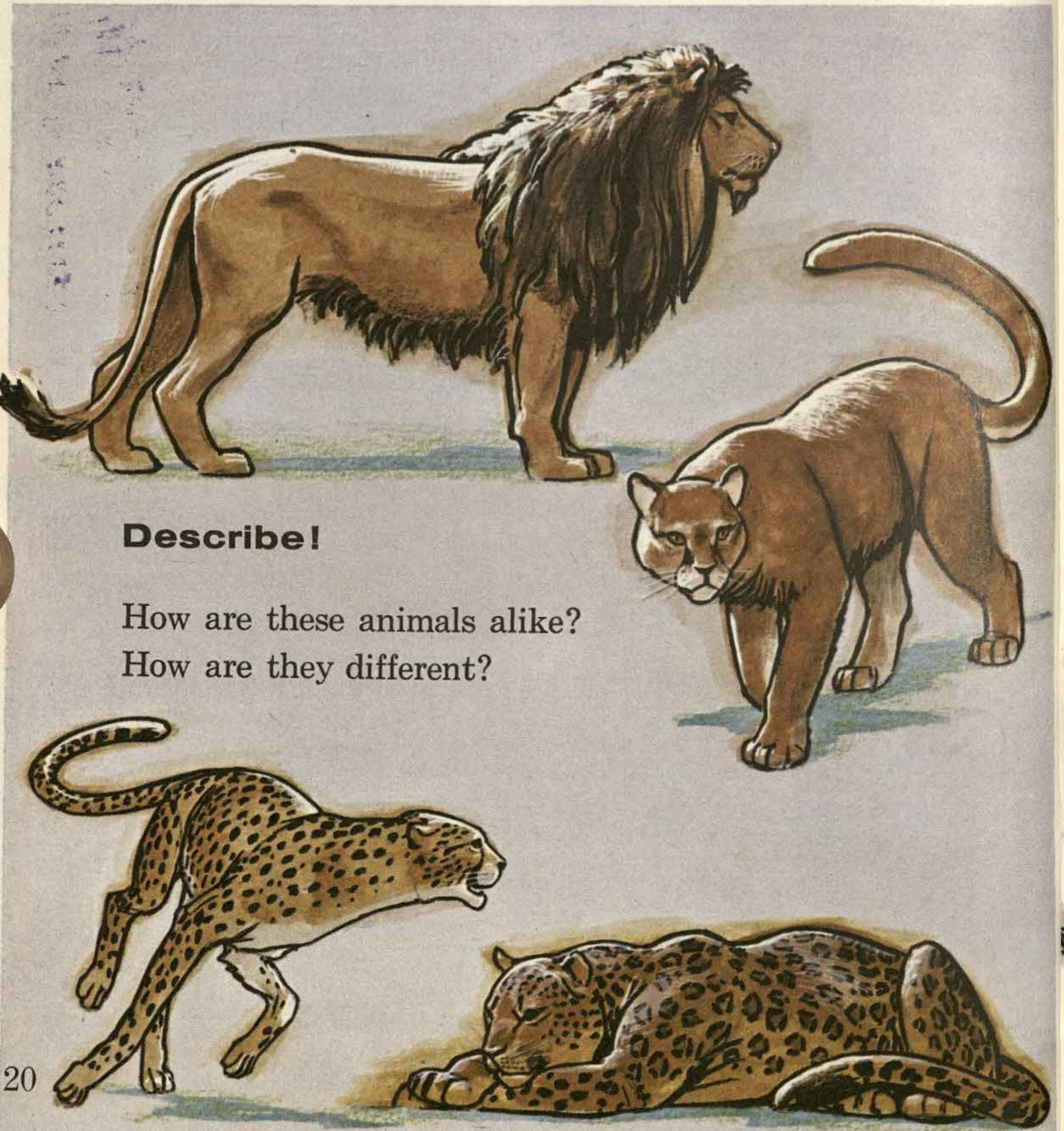
Describe these animals.
How are they alike?
Do they all have fur or hair?
What else is similar?
Do they all feed their young the same way?





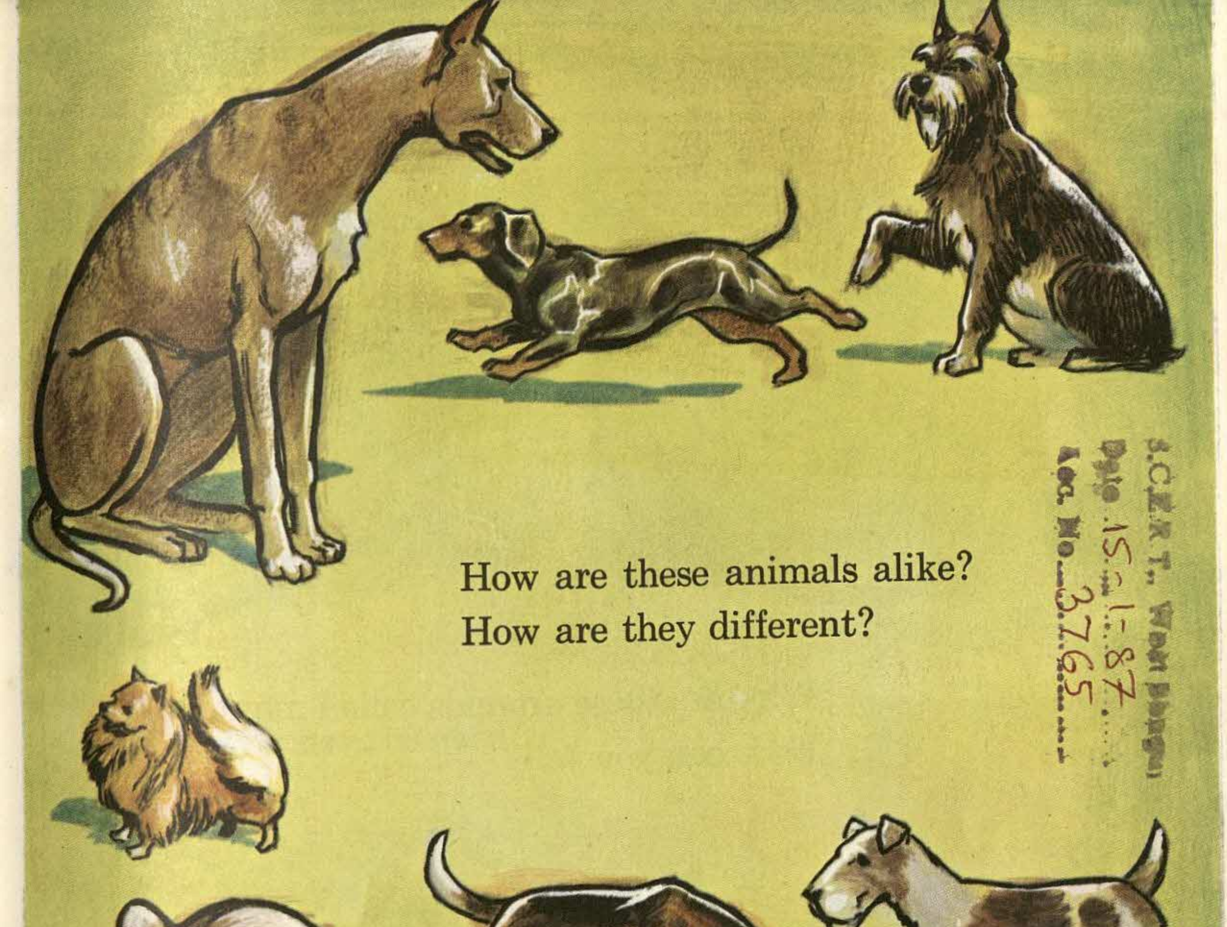
How are these animals different from mammals?



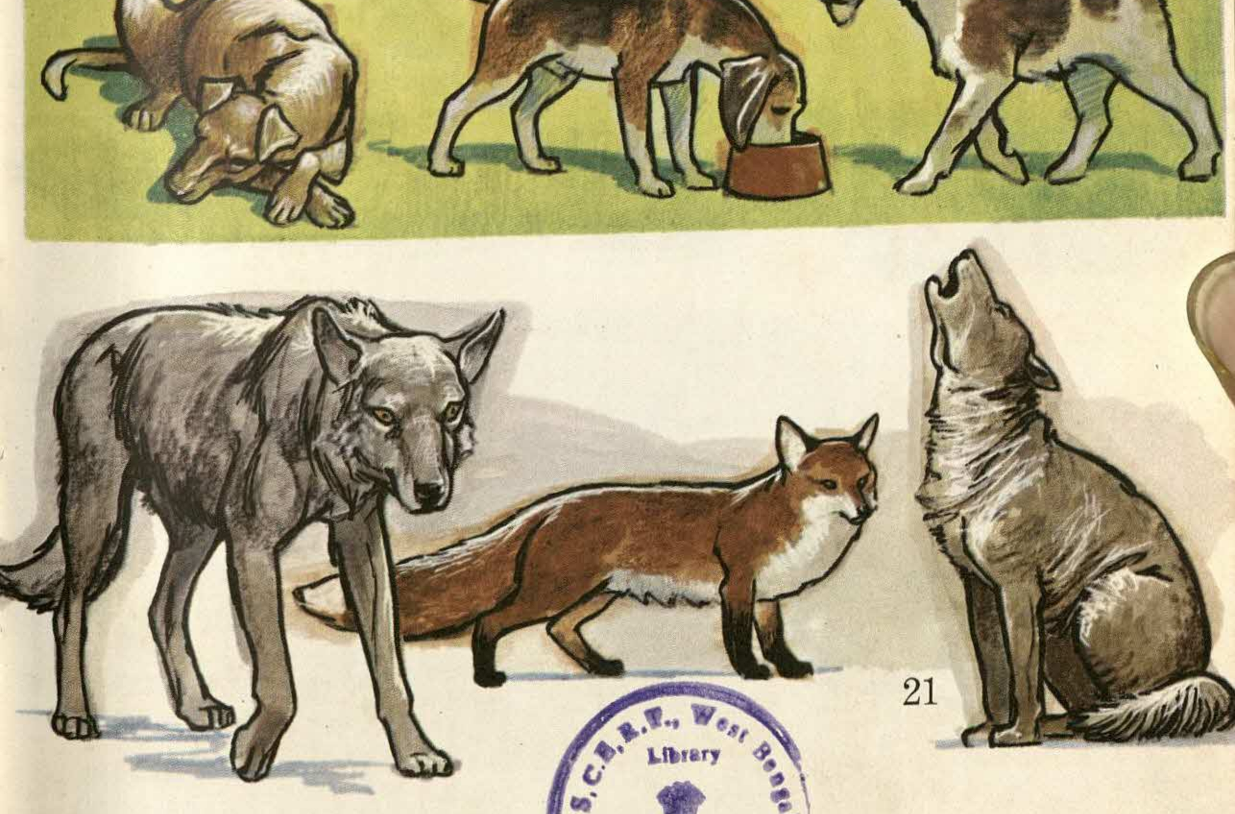


Describe!

How are these animals alike?
How are they different?



How are these animals alike?
How are they different?



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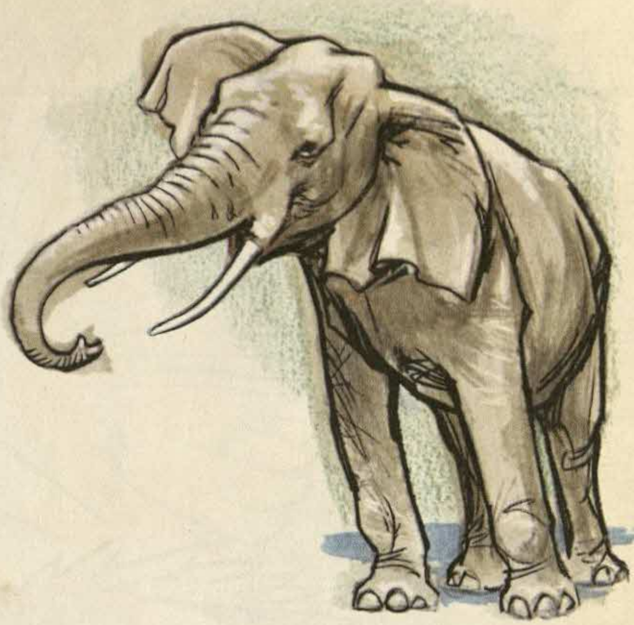
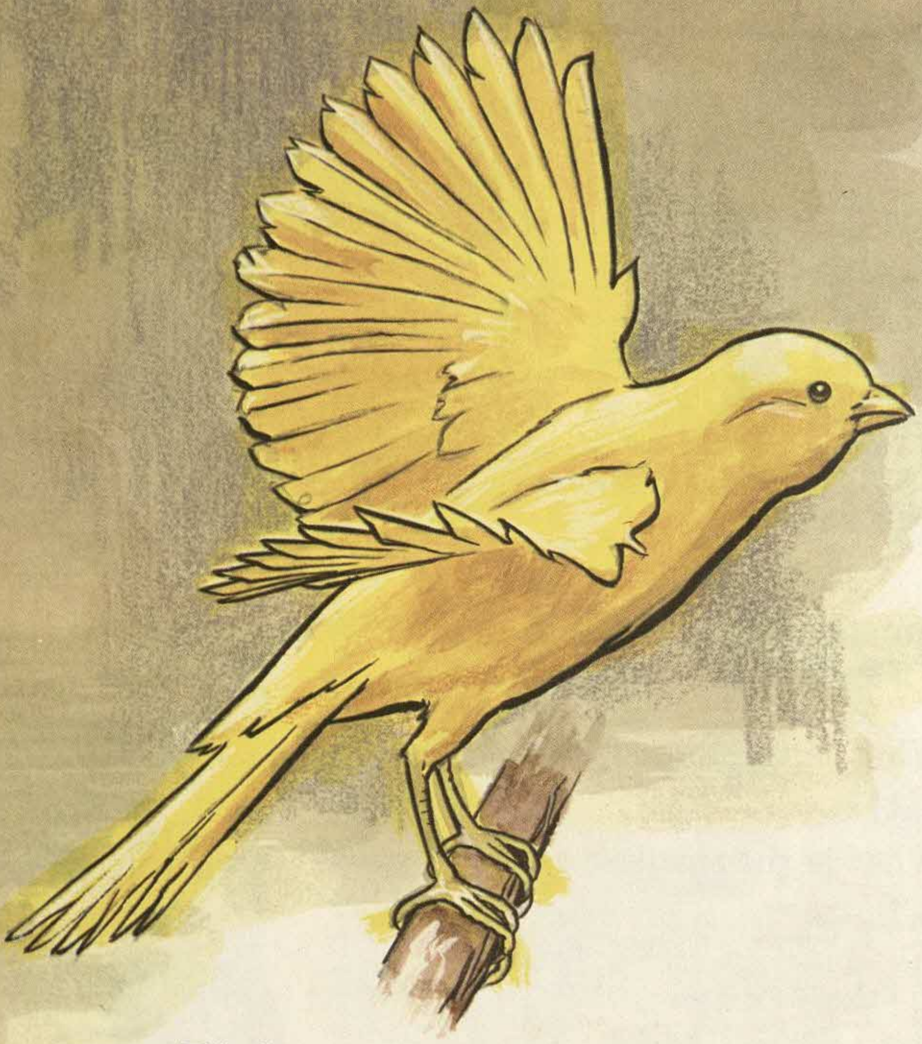
Why are these animals called mammals?
How can you tell?



Large and Small

What is the largest animal you know about?

What is the smallest animal you have seen?

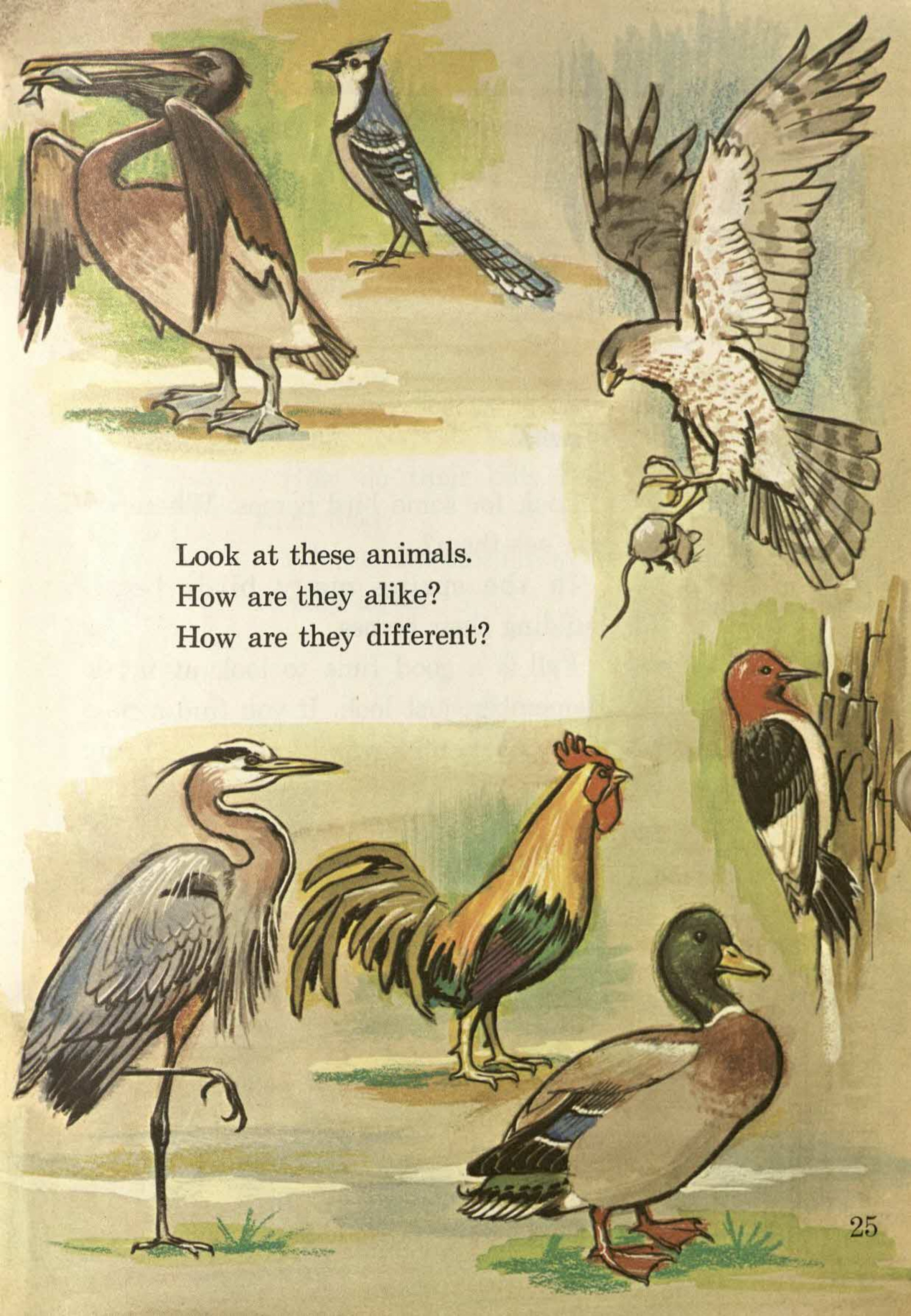


Birds

Describe this bird.

What does the bird have instead of front legs?

How is a bird different from all other animals?



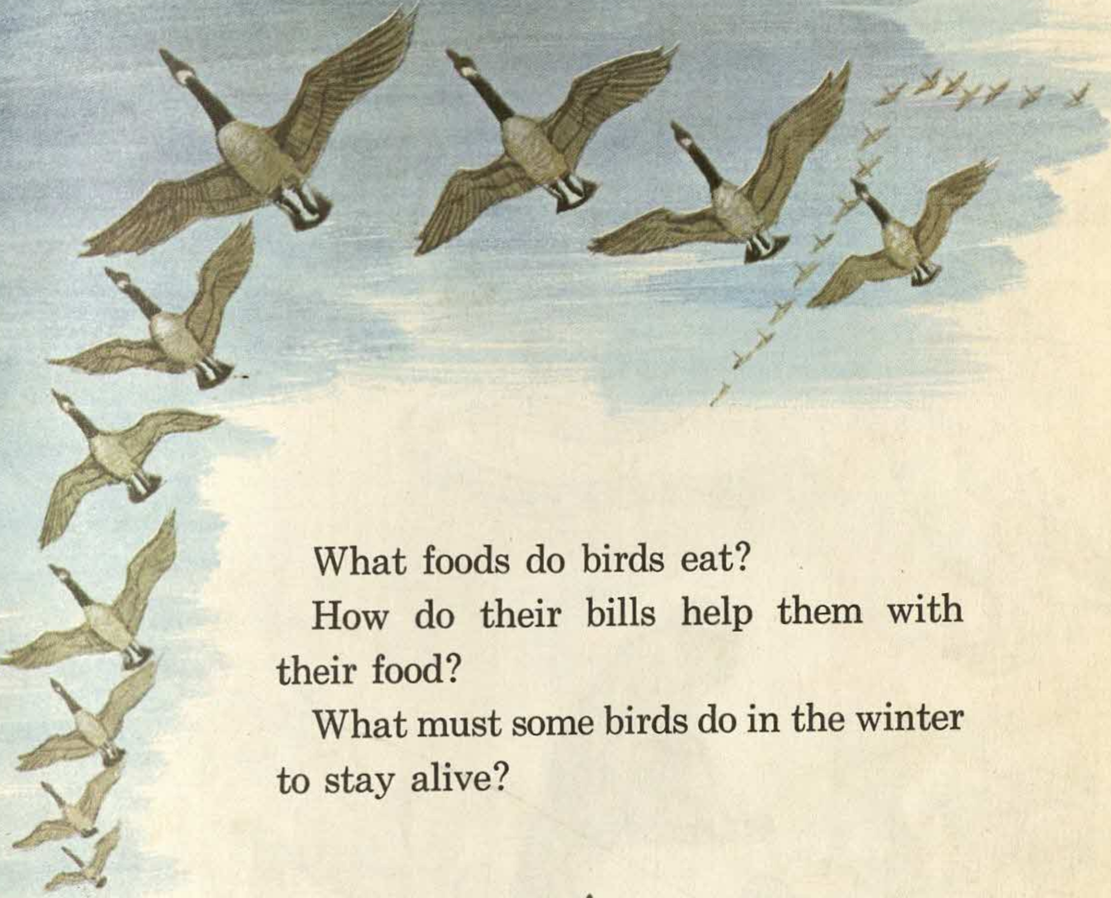
Look at these animals.
How are they alike?
How are they different?

Nests

Look for some bird homes. Where do you see them?

In the spring many birds begin building their homes.

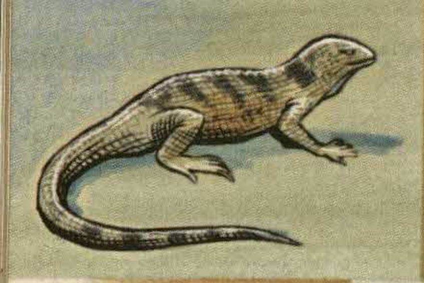
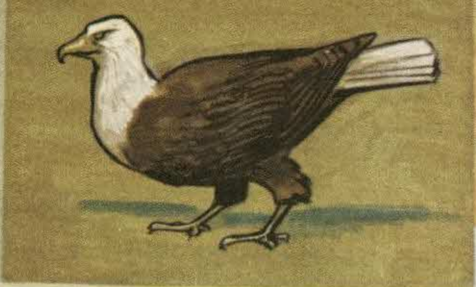
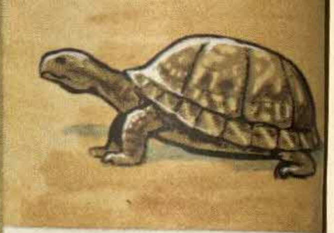
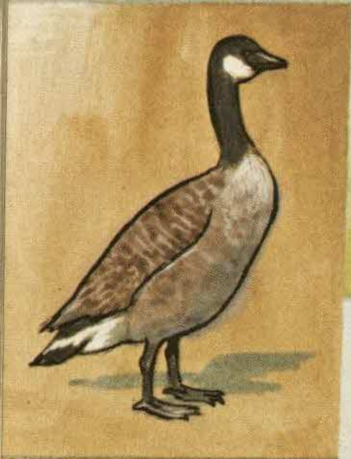
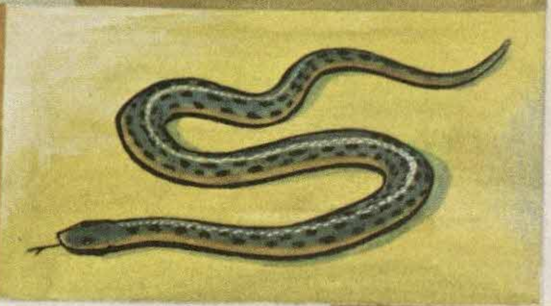
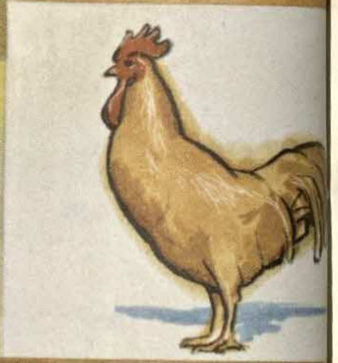
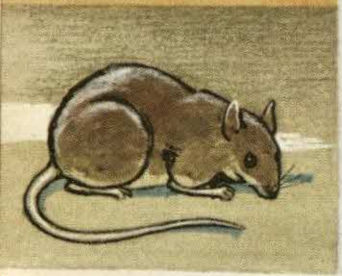
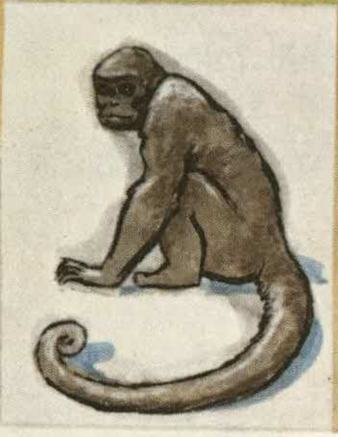
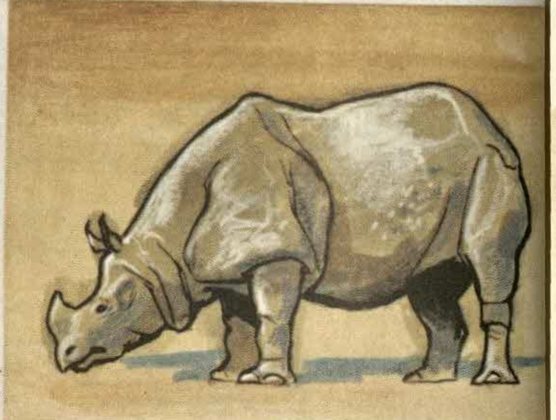
Fall is a good time to look at nests. Remember, just look. If you find a nest that has been blown out of a tree, bring it to class.



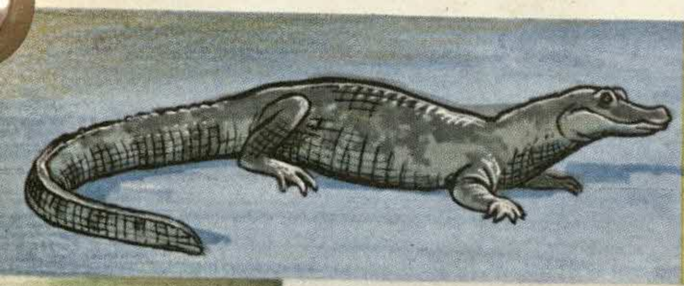
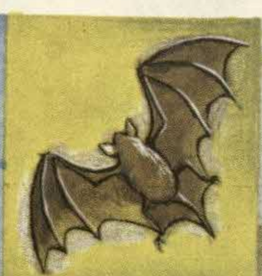
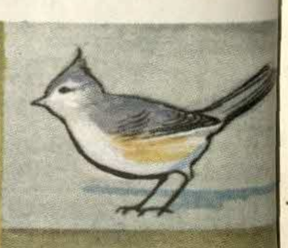
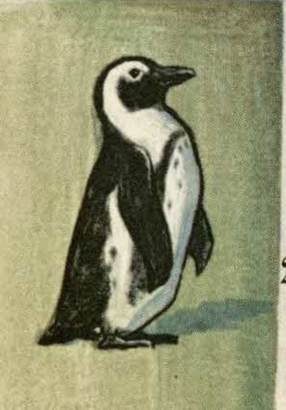
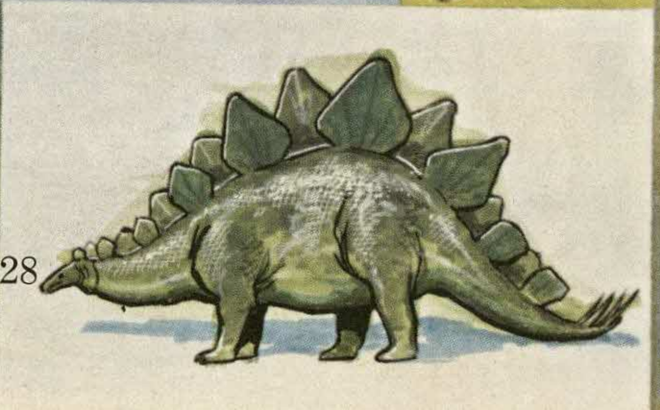
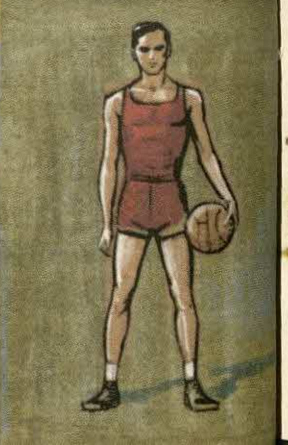
What foods do birds eat?

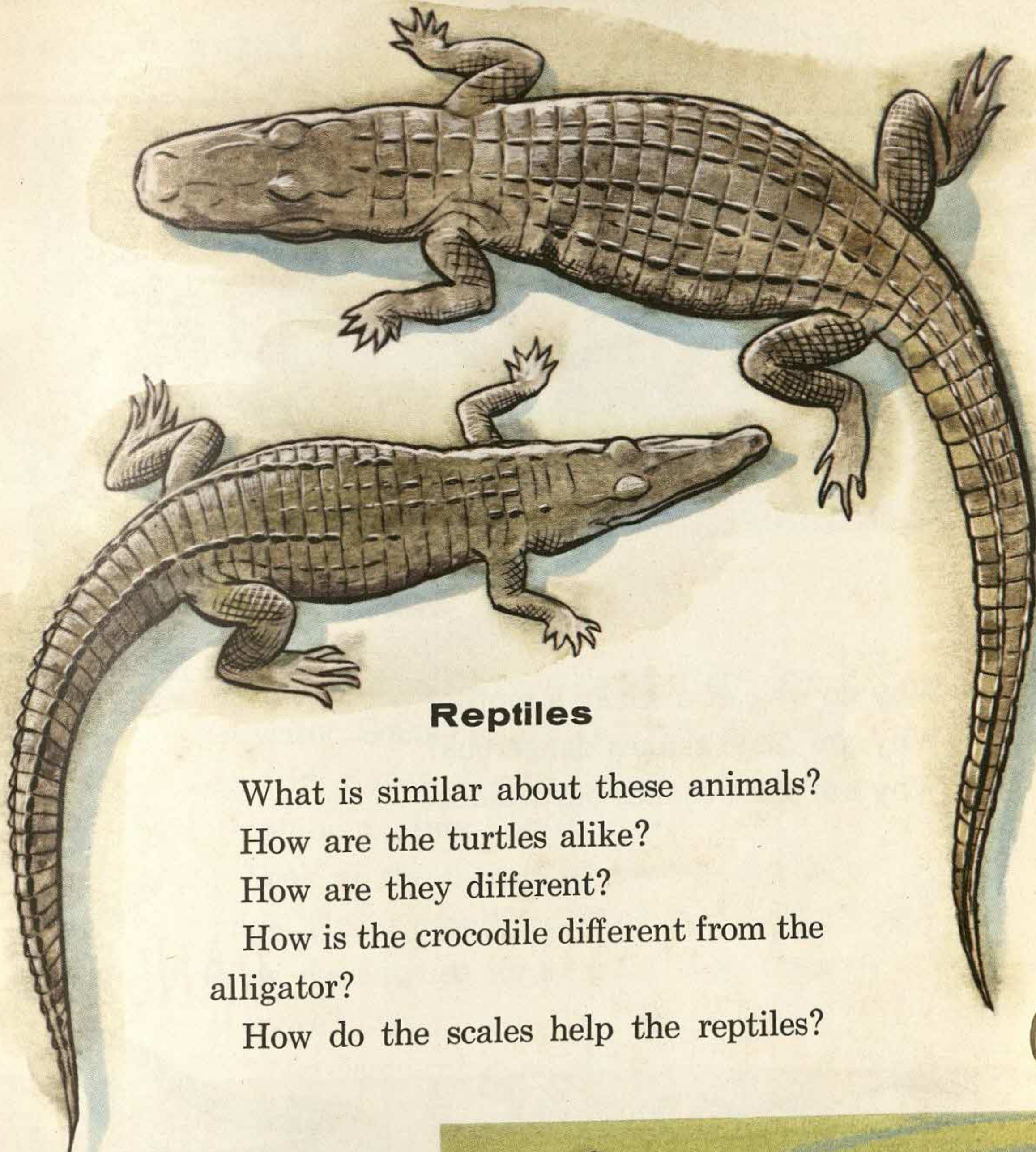
How do their bills help them with their food?

What must some birds do in the winter to stay alive?

Can you group similar animals?



Reptiles

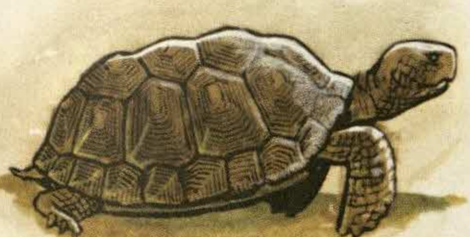
What is similar about these animals?

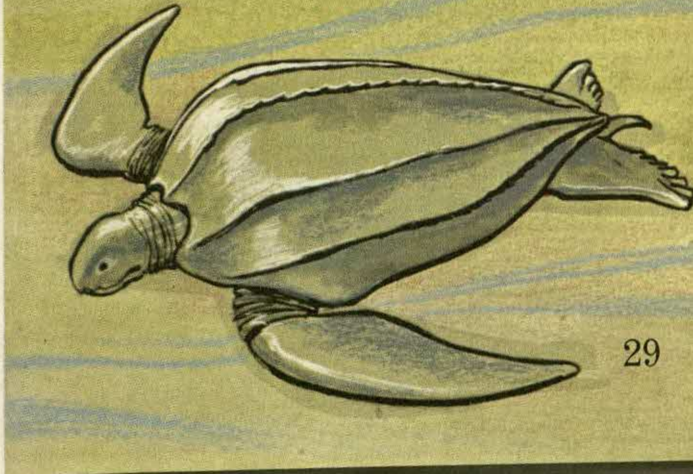
How are the turtles alike?

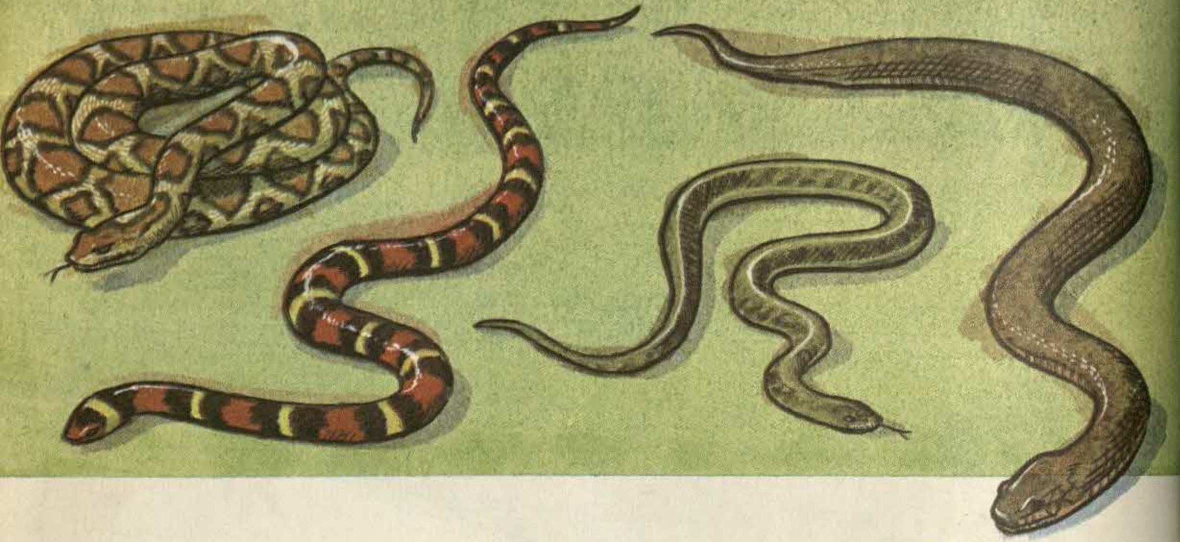
How are they different?

How is the crocodile different from the alligator?

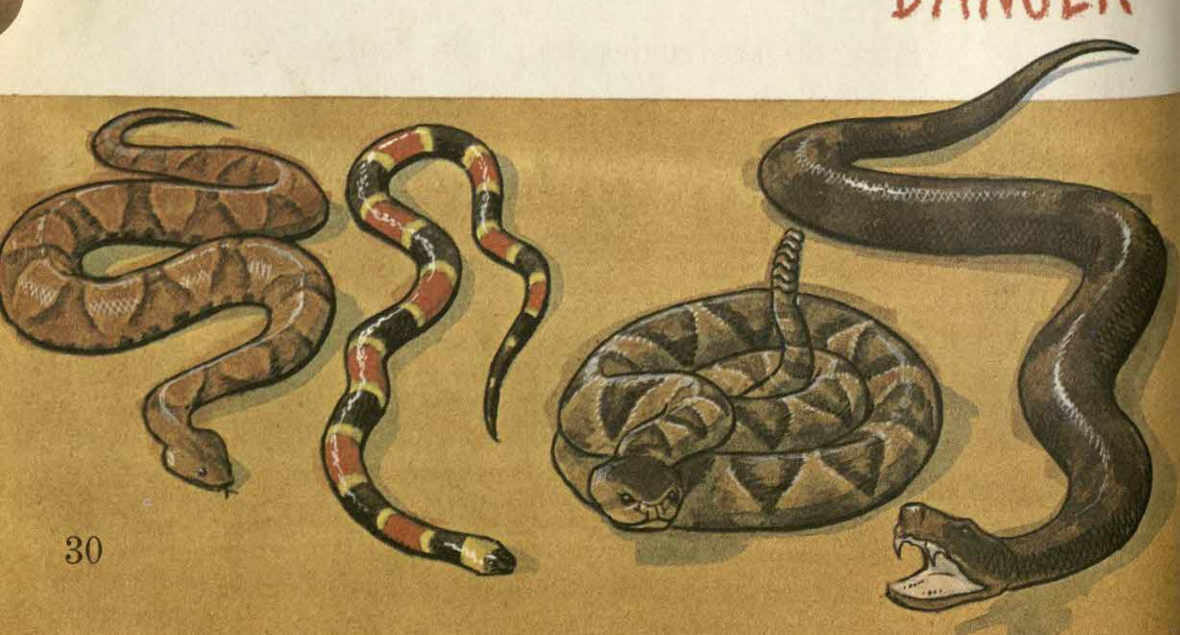
How do the scales help the reptiles?

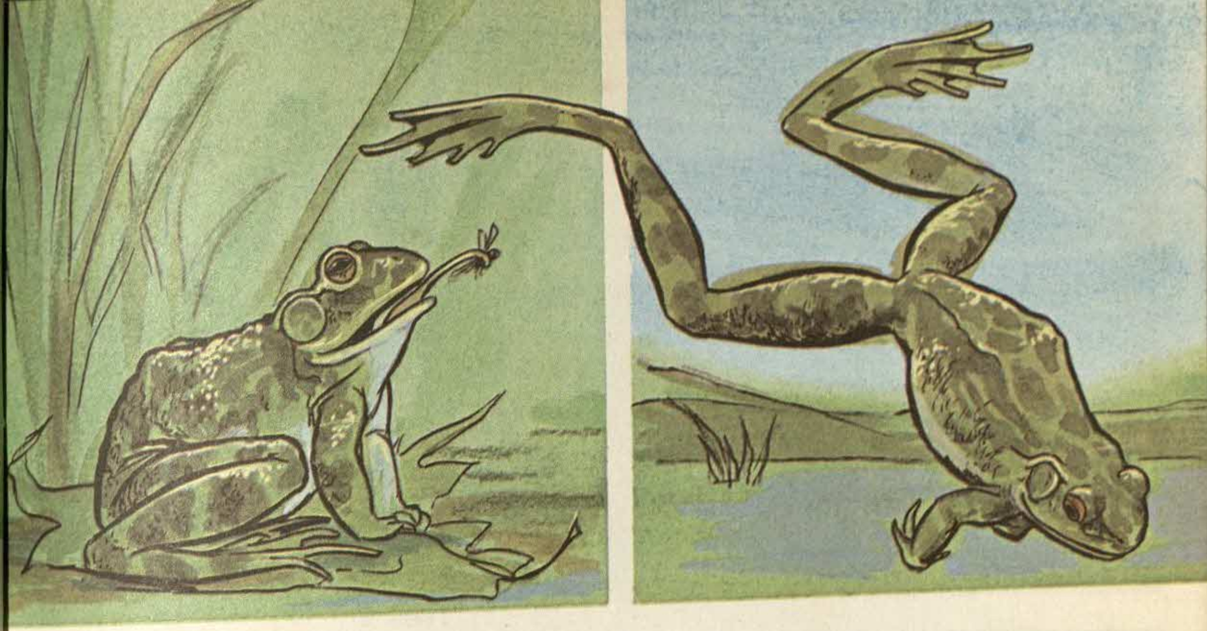






Why do we call a snake a reptile?
Why are some snakes dangerous?
Why are some snakes our friends?



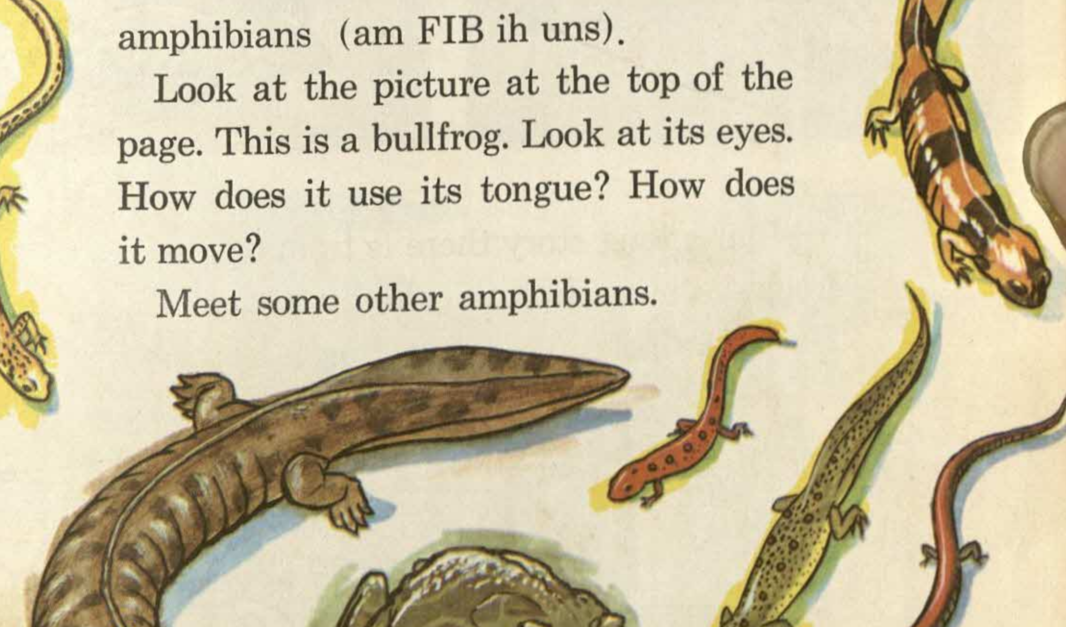


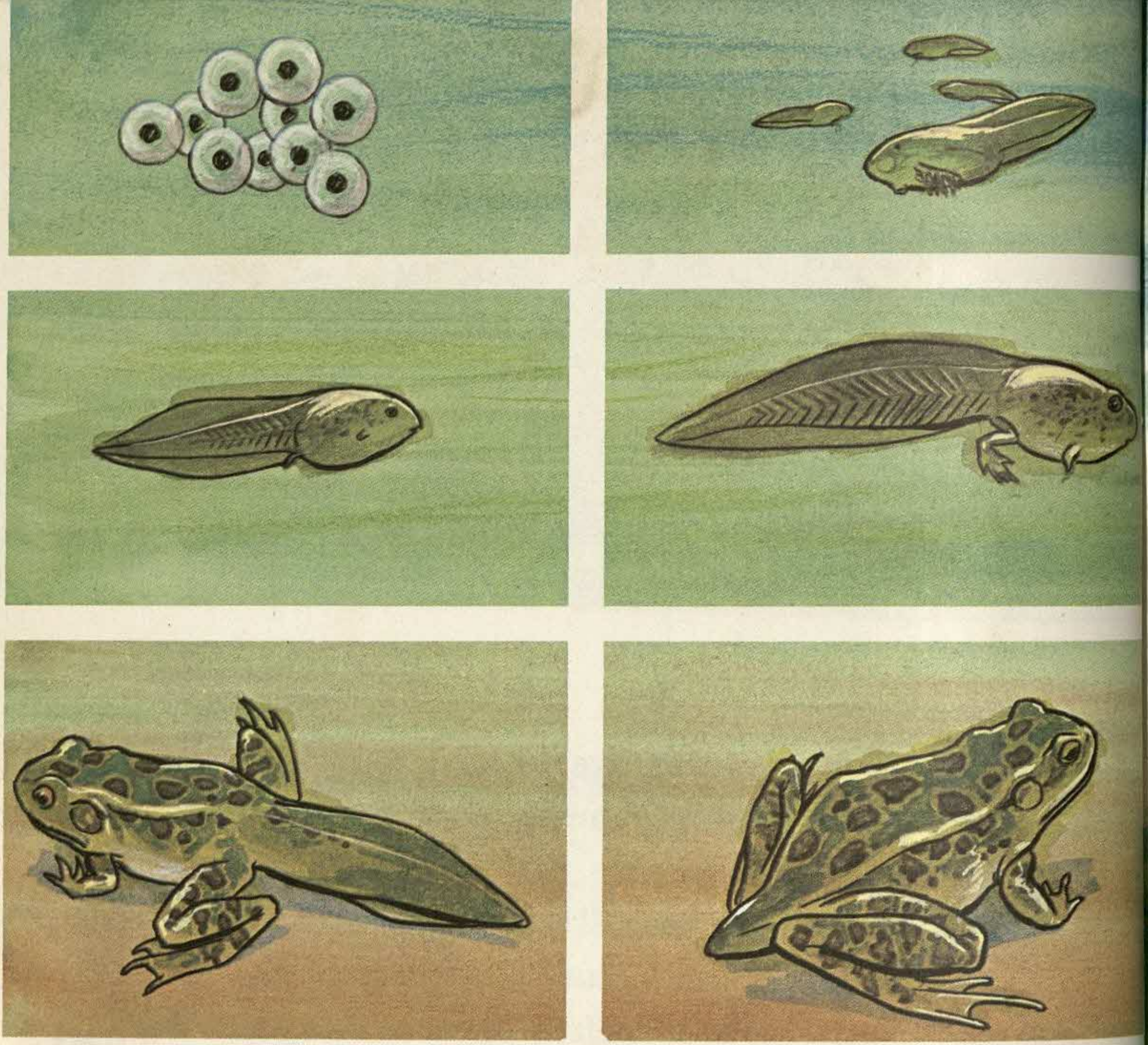
Amphibians

Some animals live on land. Some live in water. Some animals can live on land and in water. We call these animals amphibians (am FIB ih uns).

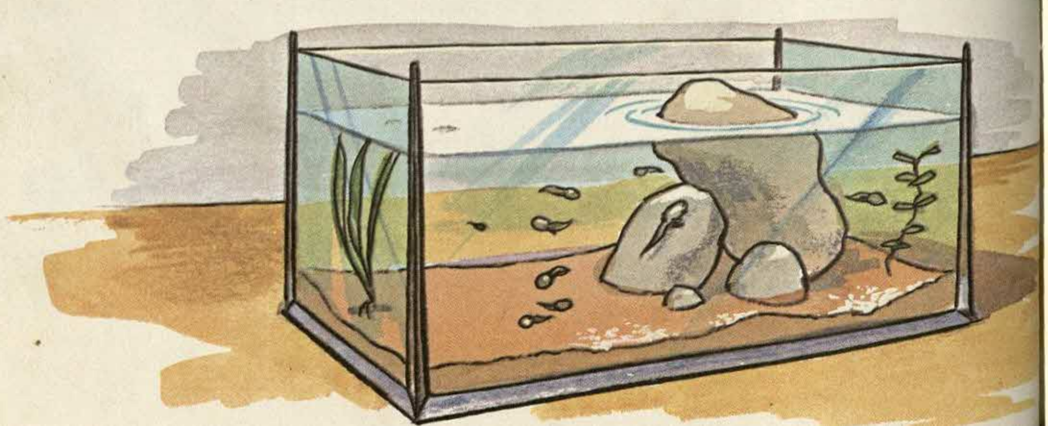
Look at the picture at the top of the page. This is a bullfrog. Look at its eyes. How does it use its tongue? How does it move?

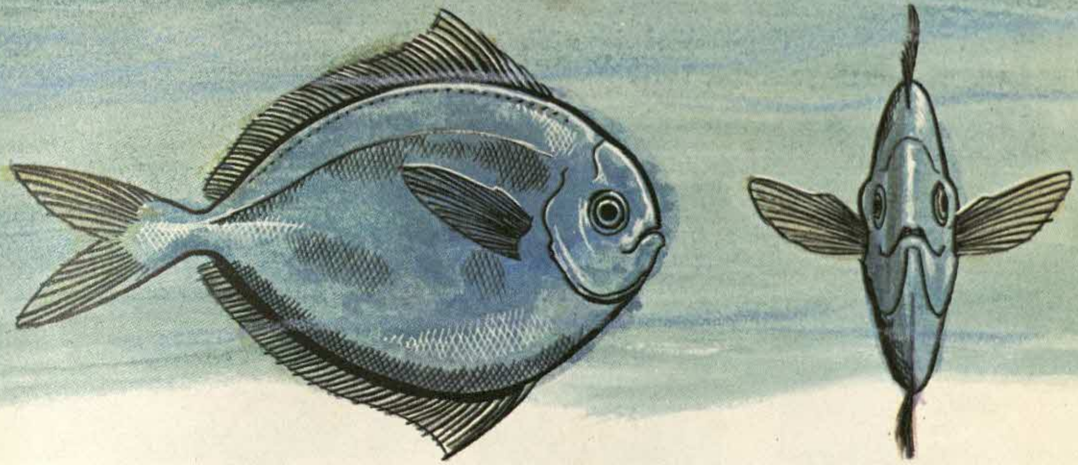
Meet some other amphibians.





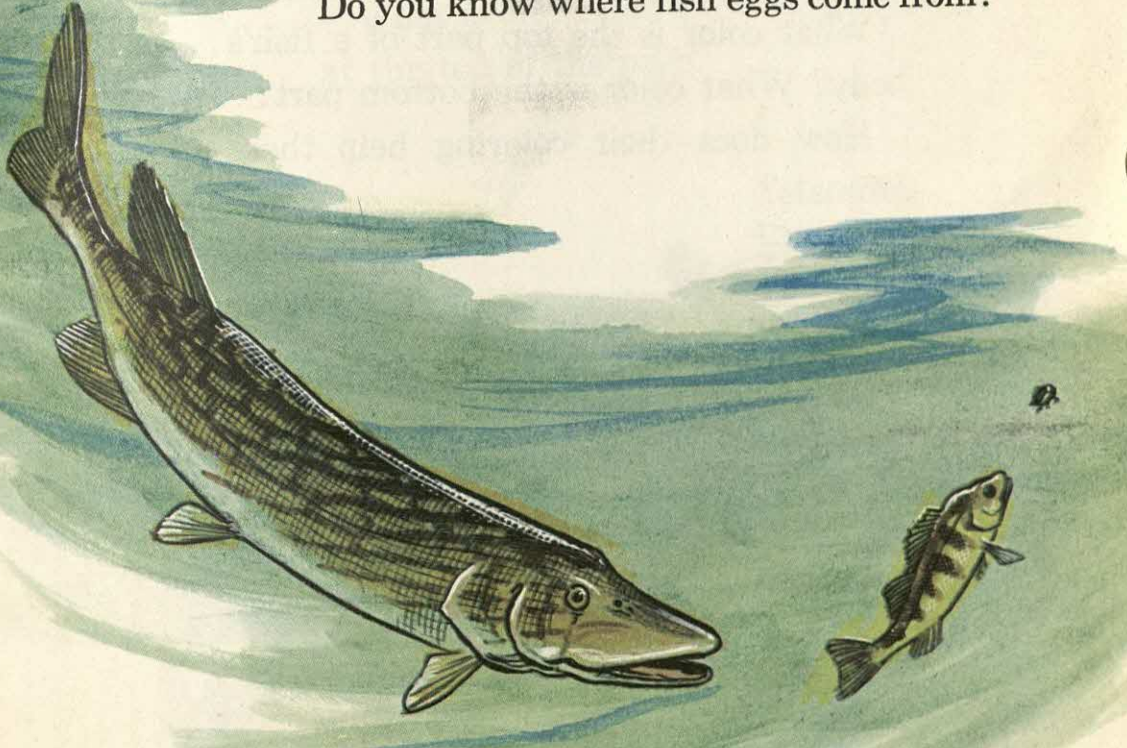
What a long story there is from egg to frog! A young frog is called a tadpole. Does a tadpole look like a frog?

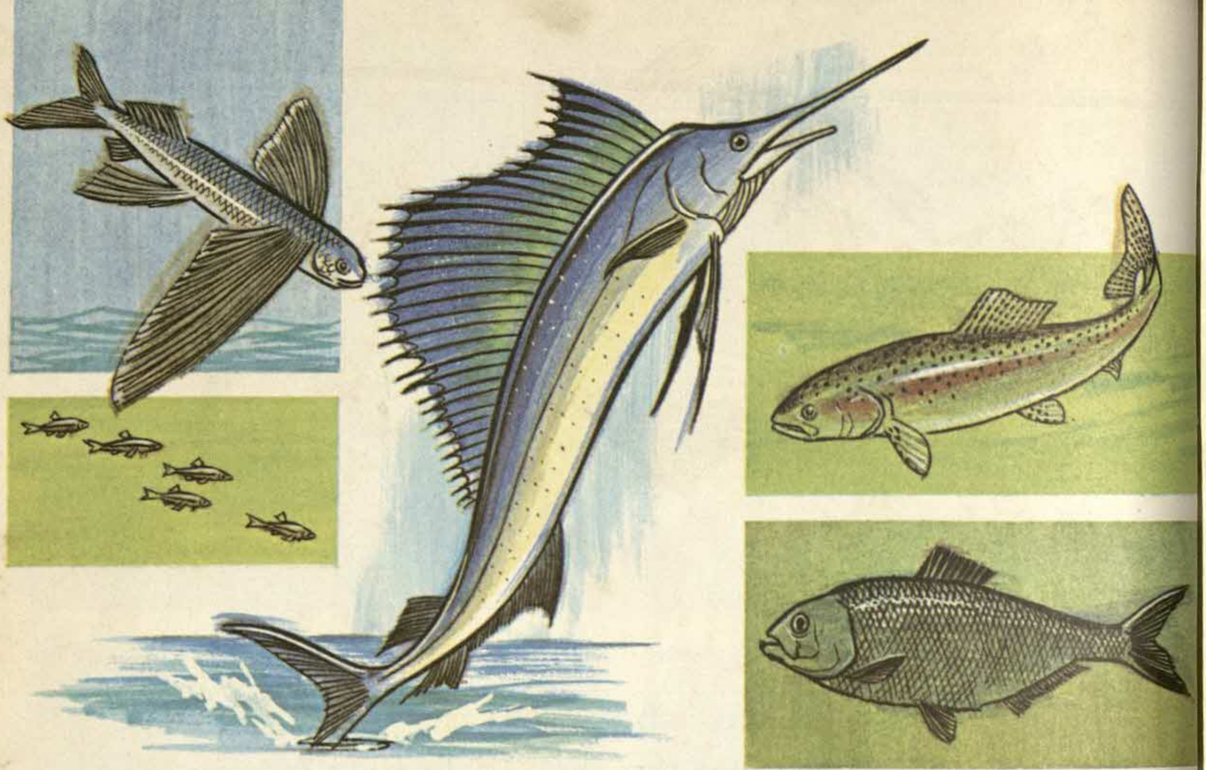




Fish

How are fish shaped?
How does the shape help them?
What do fish eat?
Do you know where fish eggs come from?

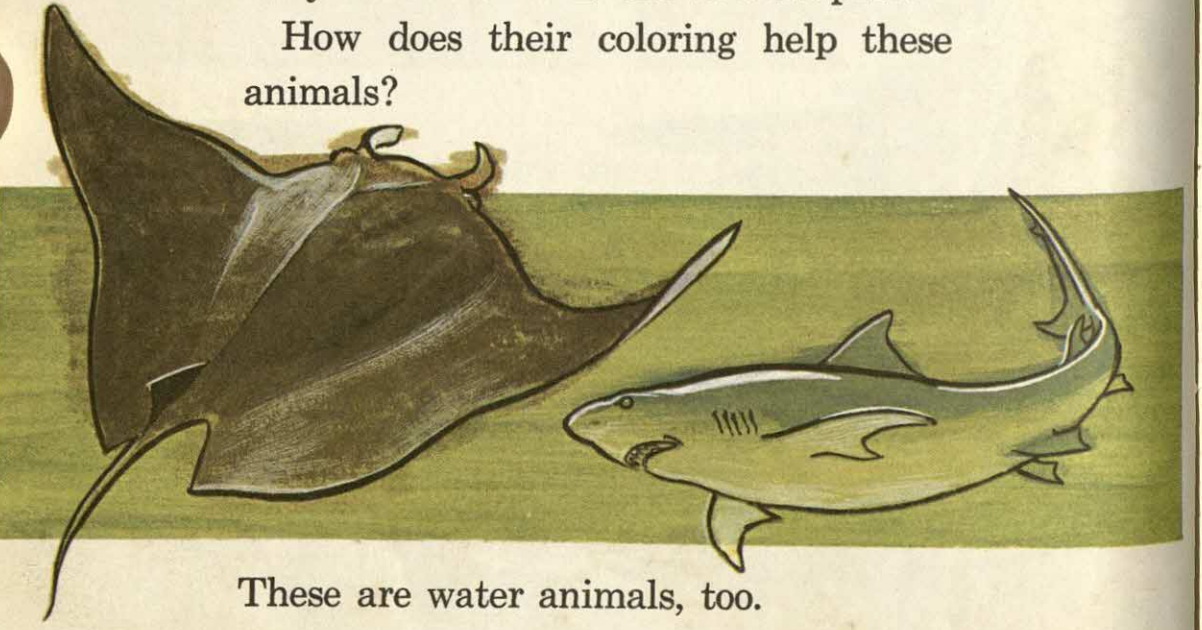




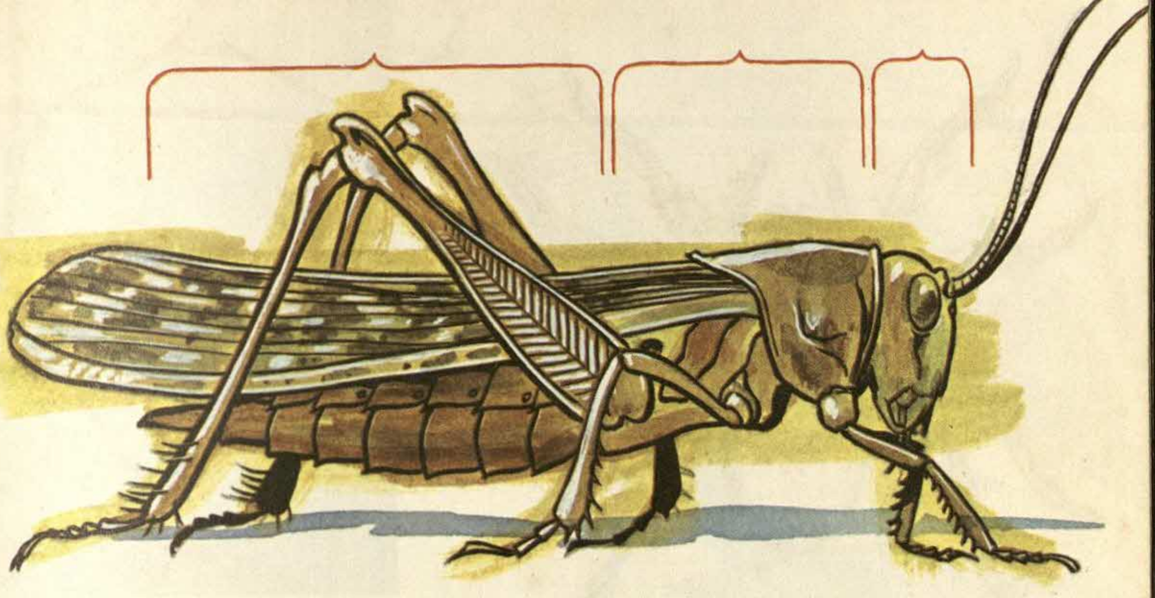
Fish are water animals. Some live in fresh water and some live in salt water.

What color is the top part of a fish's body? What color is the bottom part?

How does their coloring help these animals?

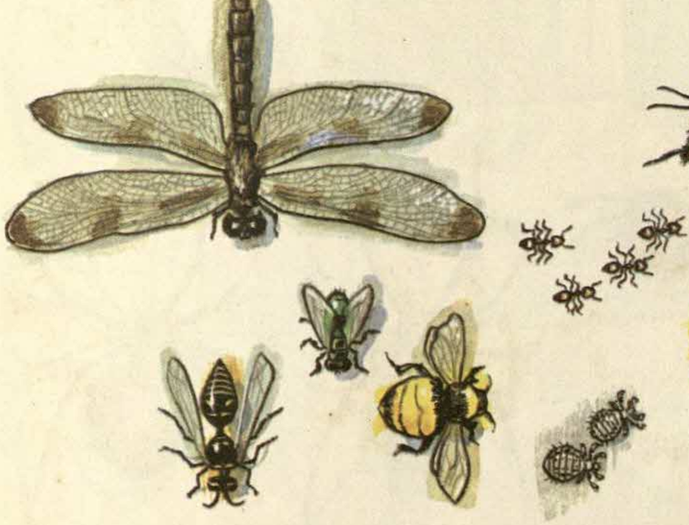


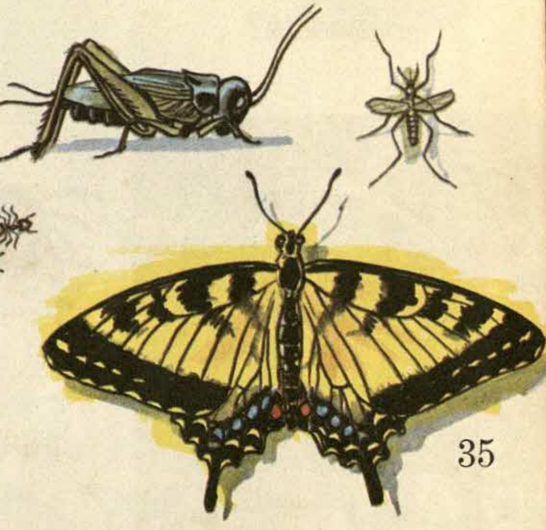
These are water animals, too.

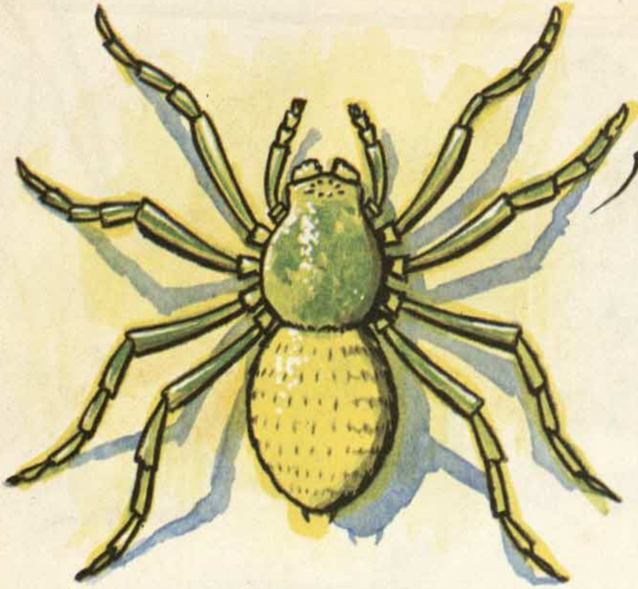


Insects, Insects

What is an insect? Look at the picture at the top of the page.







Are Spiders Insects?

How many legs does an insect have? How many parts are there to the body of an insect?

Look at the picture of the spider. Count its legs. Count its body parts. Are spiders insects?

Look at the other pictures. Are these insects?

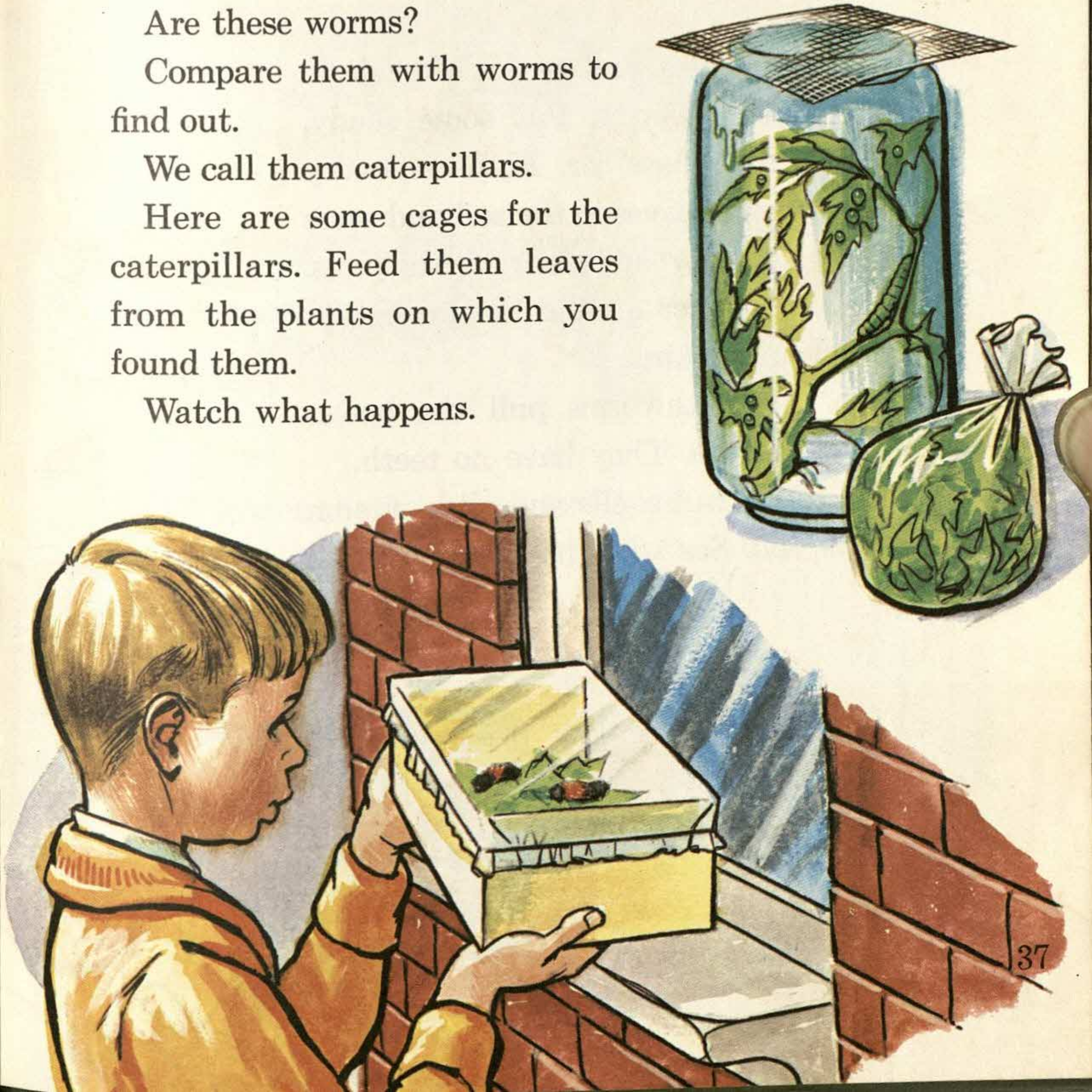
Are these worms?

Compare them with worms to find out.

We call them caterpillars.

Here are some cages for the caterpillars. Feed them leaves from the plants on which you found them.

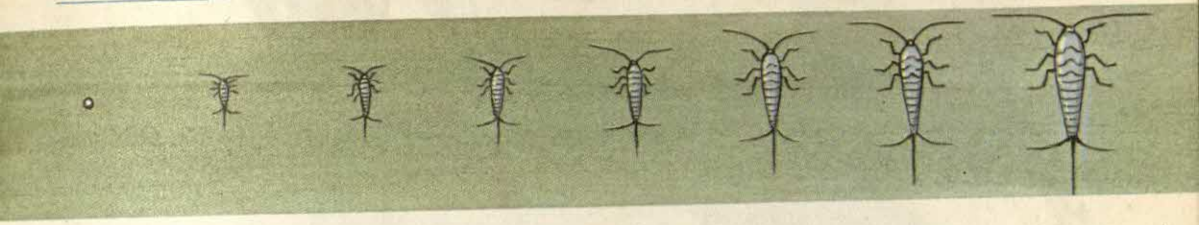
Watch what happens.

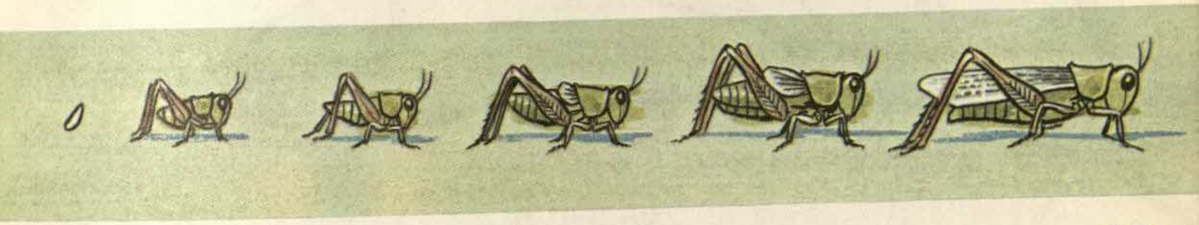


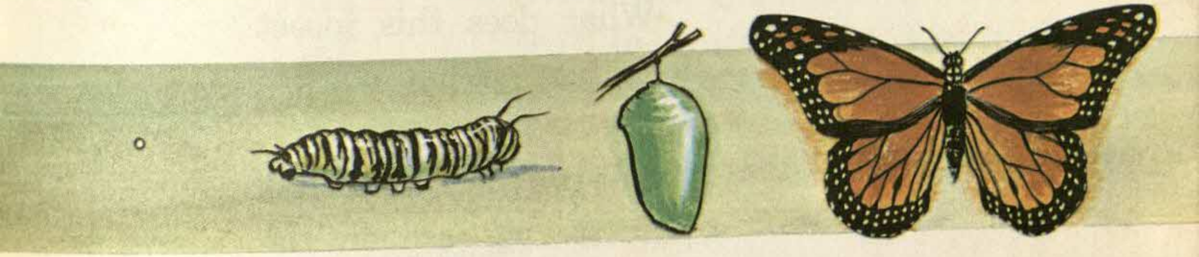
Take a flashlight and go out after dark. Find some earthworms. Put some sandy, damp soil in a glass jar. Find some dry leaves. Put some leaves in the soil and some on top of it. Now add your earthworms. Keep a black paper around the jar except when you are looking.

Watch the earthworms pull the leaves into their mouths. They have no teeth.

Put some walnut shells and olive pits on top of the soil. See what happens.

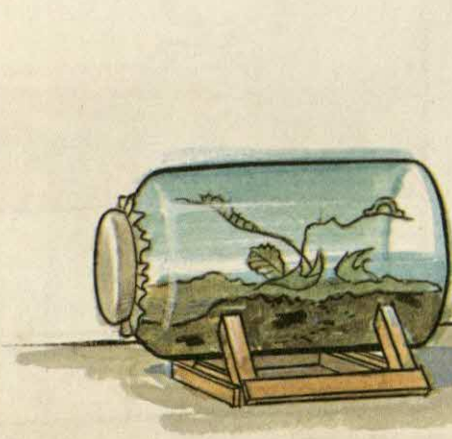


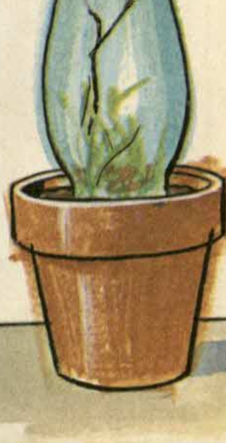


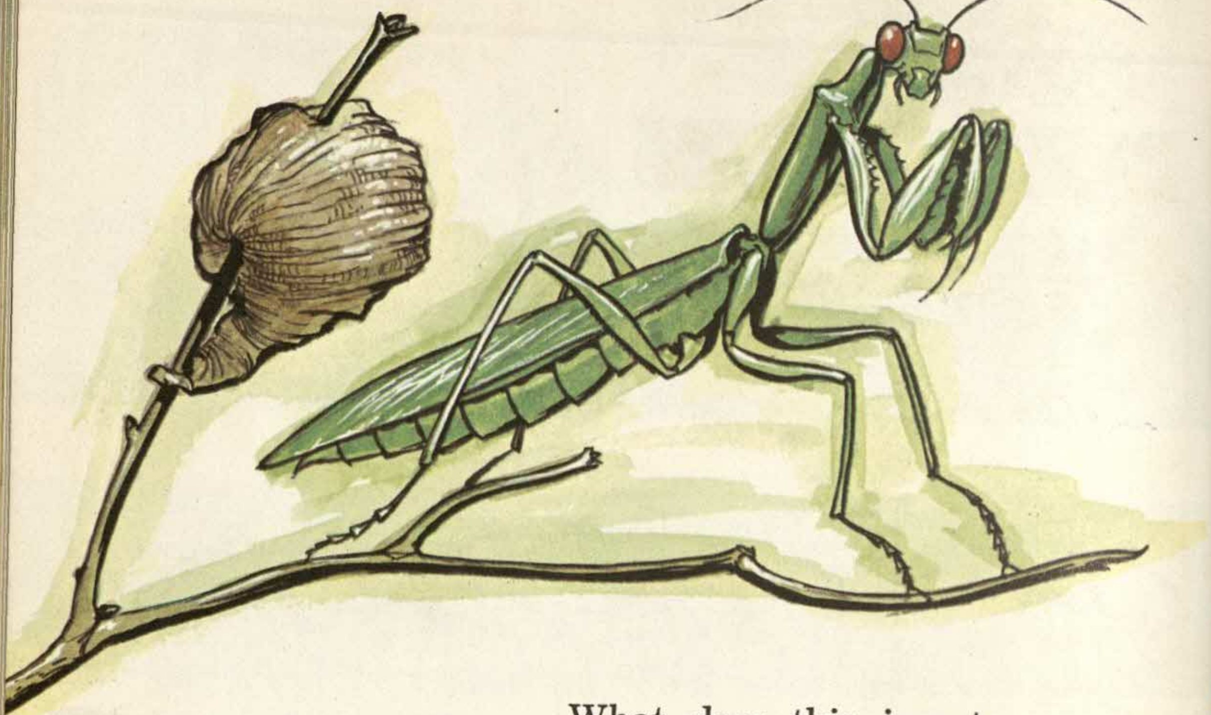


All insects hatch from eggs. Some young insects look like their parents. Others do not.

Catch some insects. Here are some insect cages.



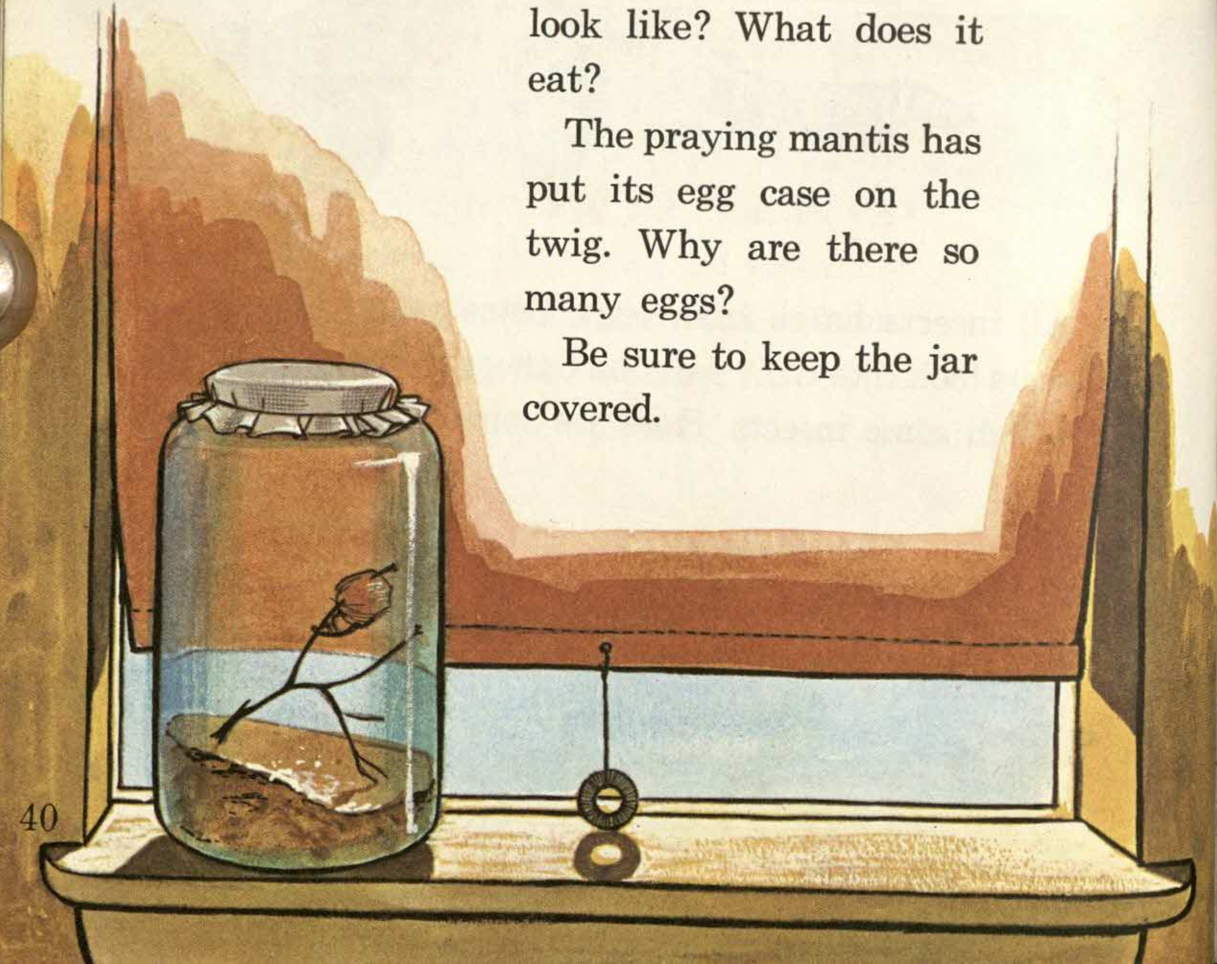


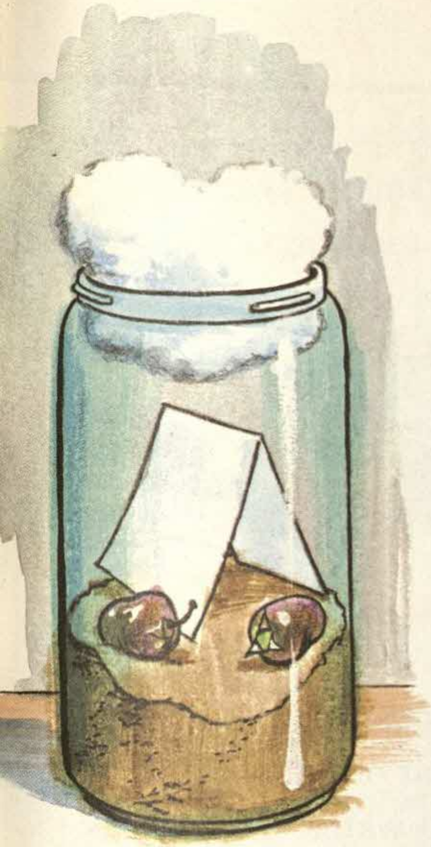


What does this insect look like? What does it eat?

The praying mantis has put its egg case on the twig. Why are there so many eggs?

Be sure to keep the jar covered.



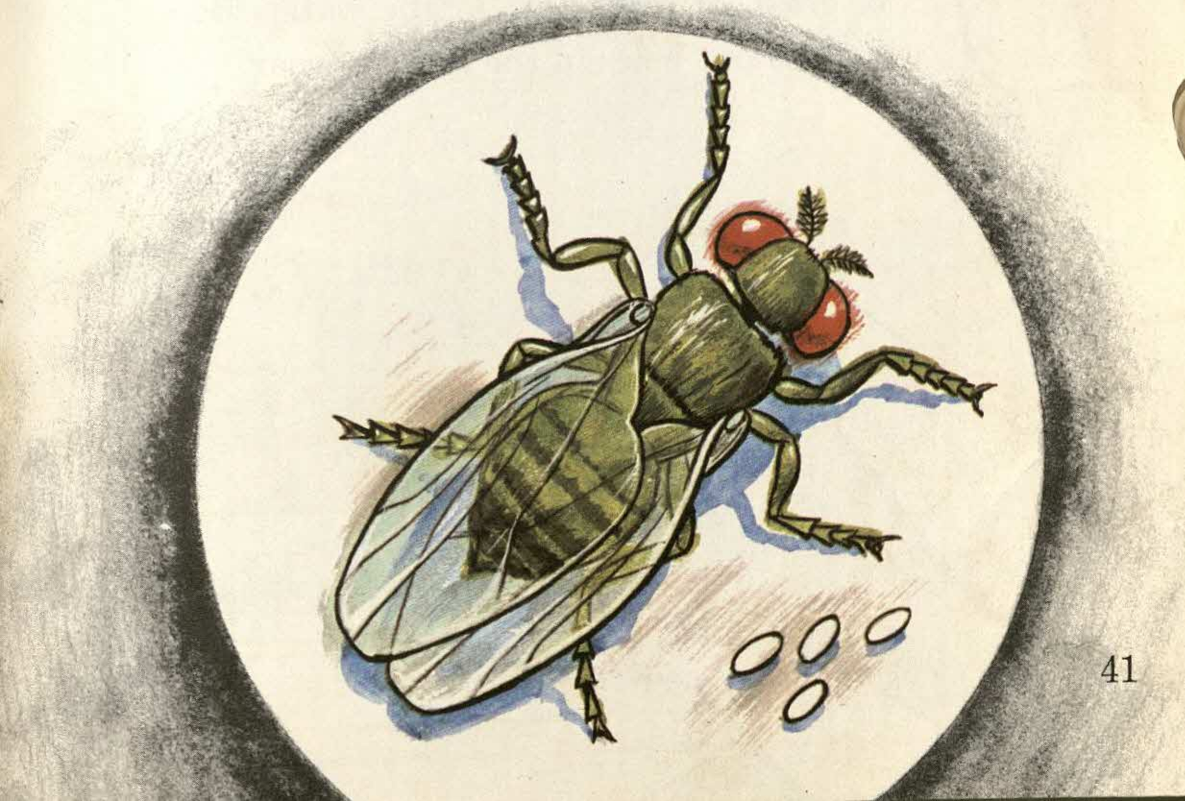


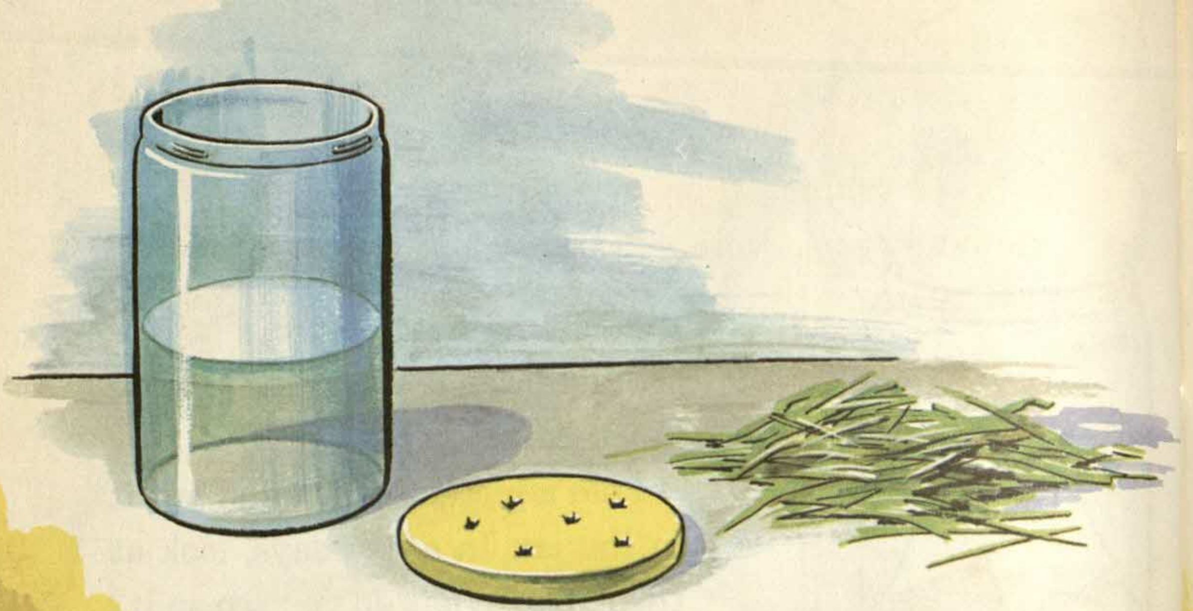
Put a very ripe grape or two in a glass jar with a little soil. Put the jar in a warm place.

Watch. What do you see? Better put a cover on the jar.

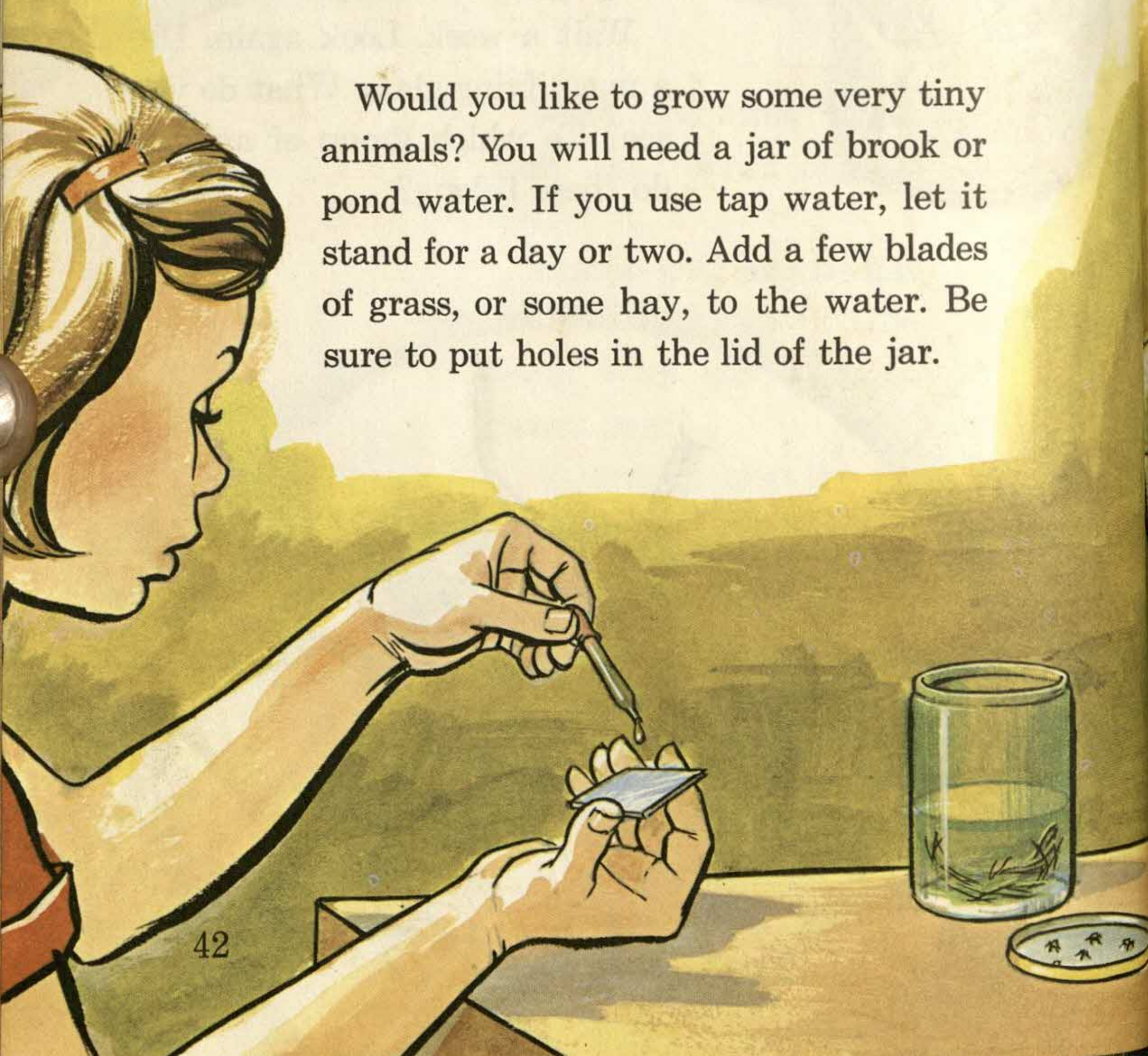
Fold a piece of paper and put it in the jar. In a few days, look at the paper. What do you see on it?

Wait a week. Look again. Use a magnifying glass. What do you see? To which group of animals do these belong?





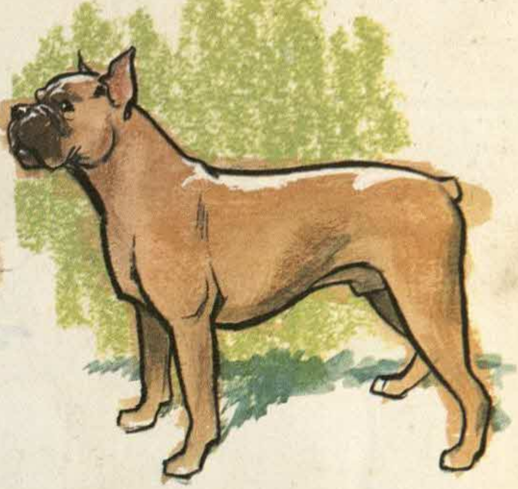
Would you like to grow some very tiny animals? You will need a jar of brook or pond water. If you use tap water, let it stand for a day or two. Add a few blades of grass, or some hay, to the water. Be sure to put holes in the lid of the jar.



You will need a microscope to see most of these animals. You may see some of the larger ones with a magnifying glass.

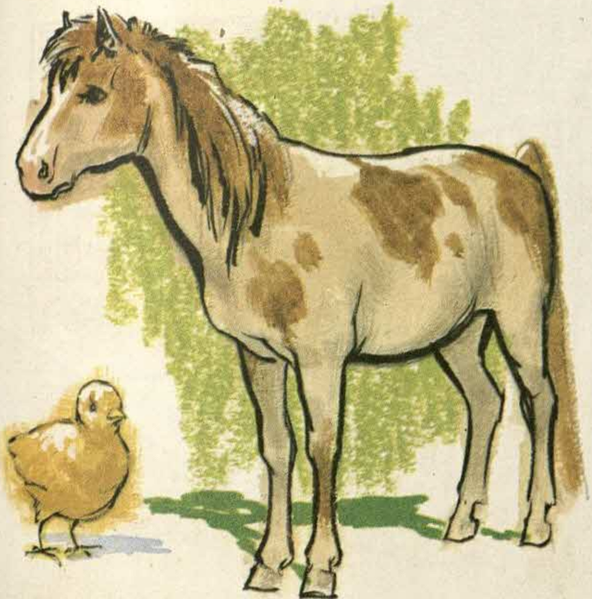
Why do cities and towns test their water supply?

So many animals live in water. Some water animals are too small for our eyes to see. A drop of water the size of a dot could hold hundreds of these little animals.



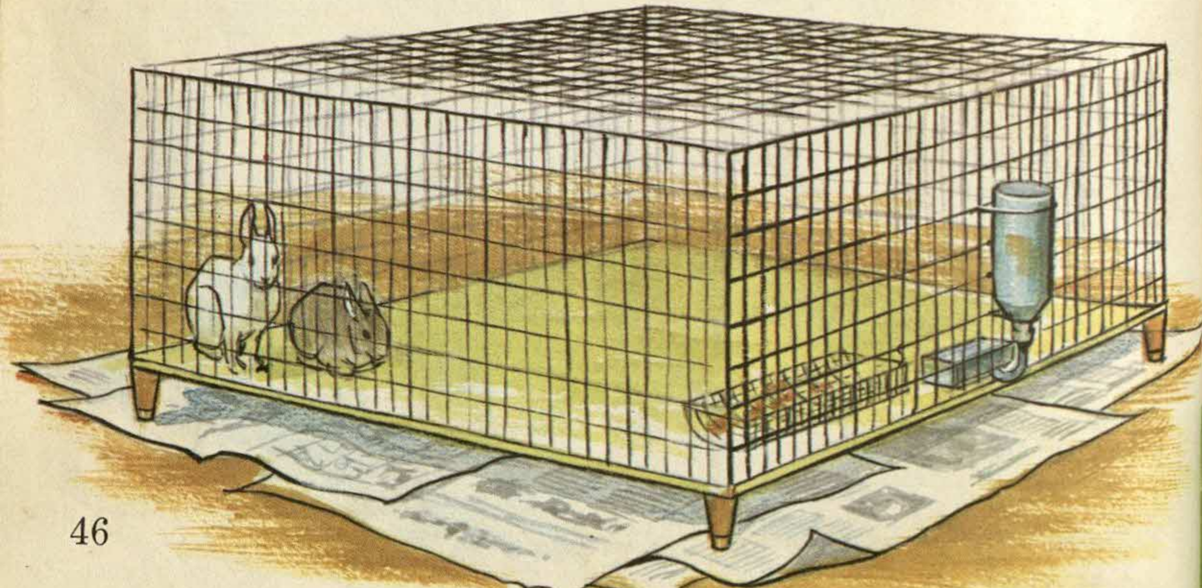
Pet Parade

Do you have a pet?
What is its name?
What kind of animal is it?
What does it eat?
Where does it sleep?
How old is it?



Classroom Pets

Meet our rabbits. They are visiting us for a few days. What will our rabbits need? Can you help take care of them?



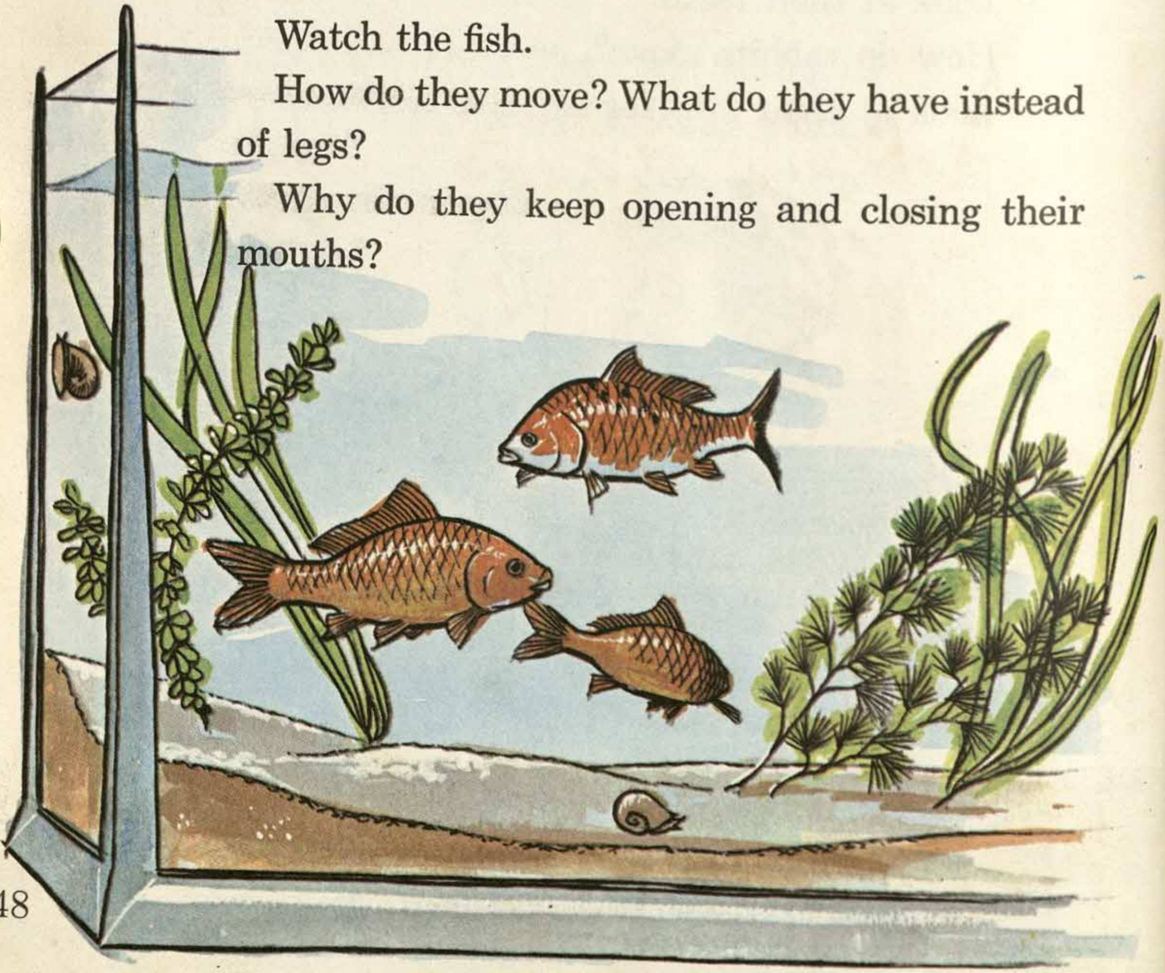
Watch the rabbits eat.
Look at their teeth.
How do rabbits move?
Look at their hind legs.

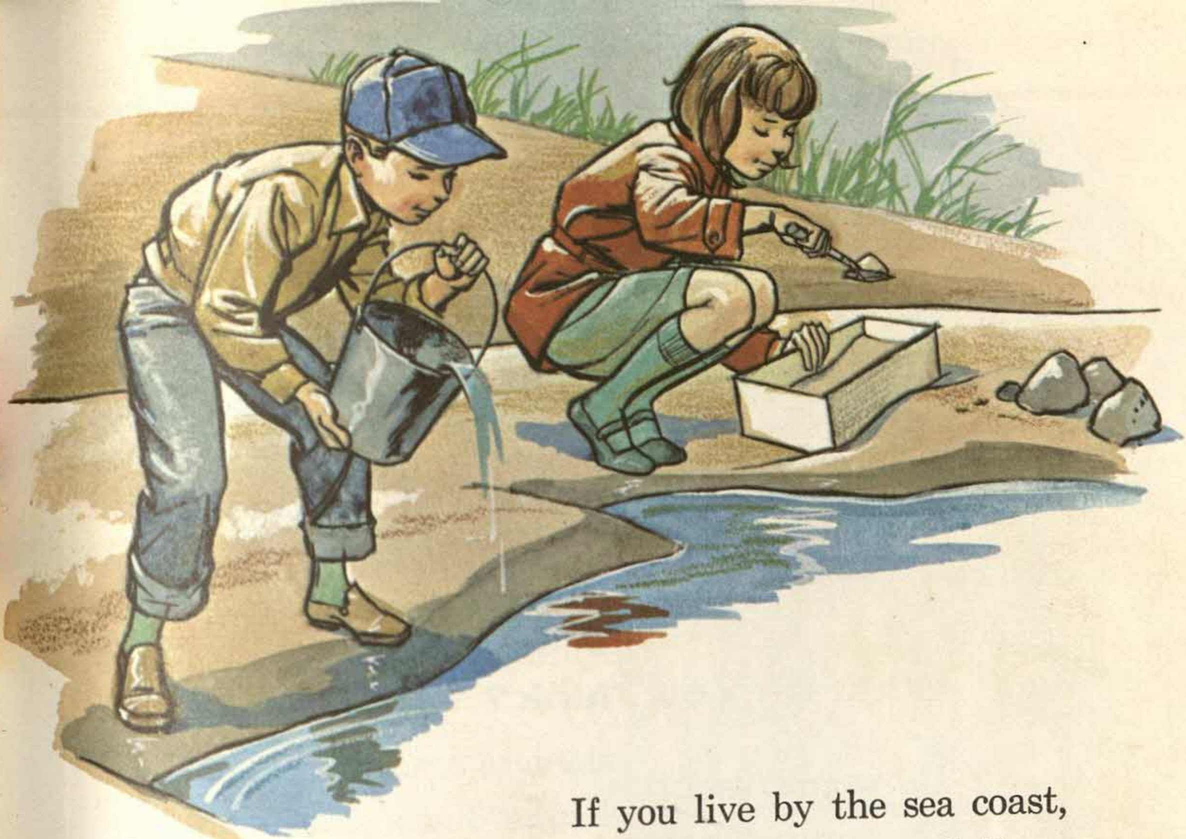
Our Aquarium

Watch the fish.

How do they move? What do they have instead of legs?

Why do they keep opening and closing their mouths?

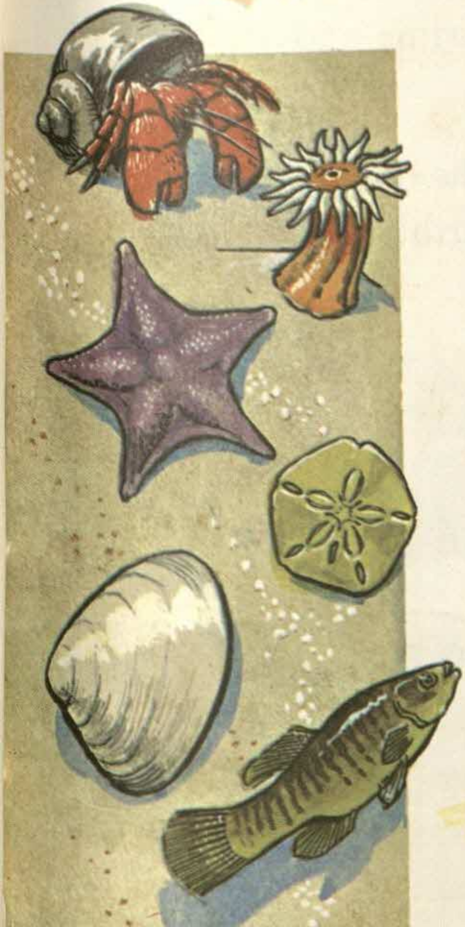


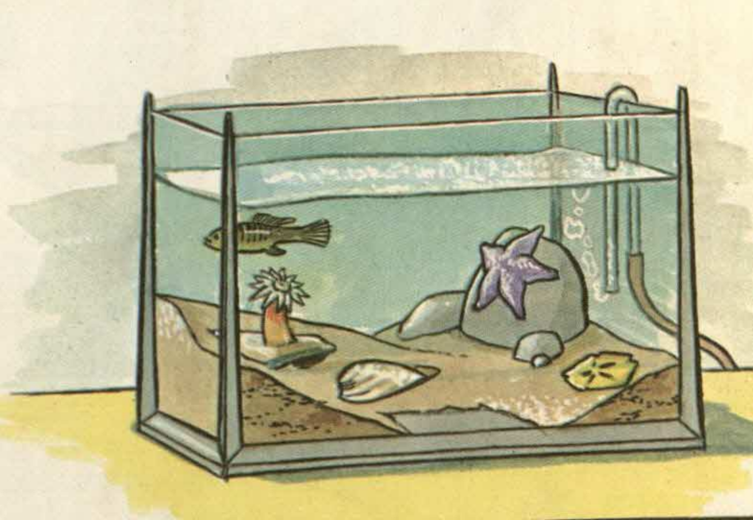


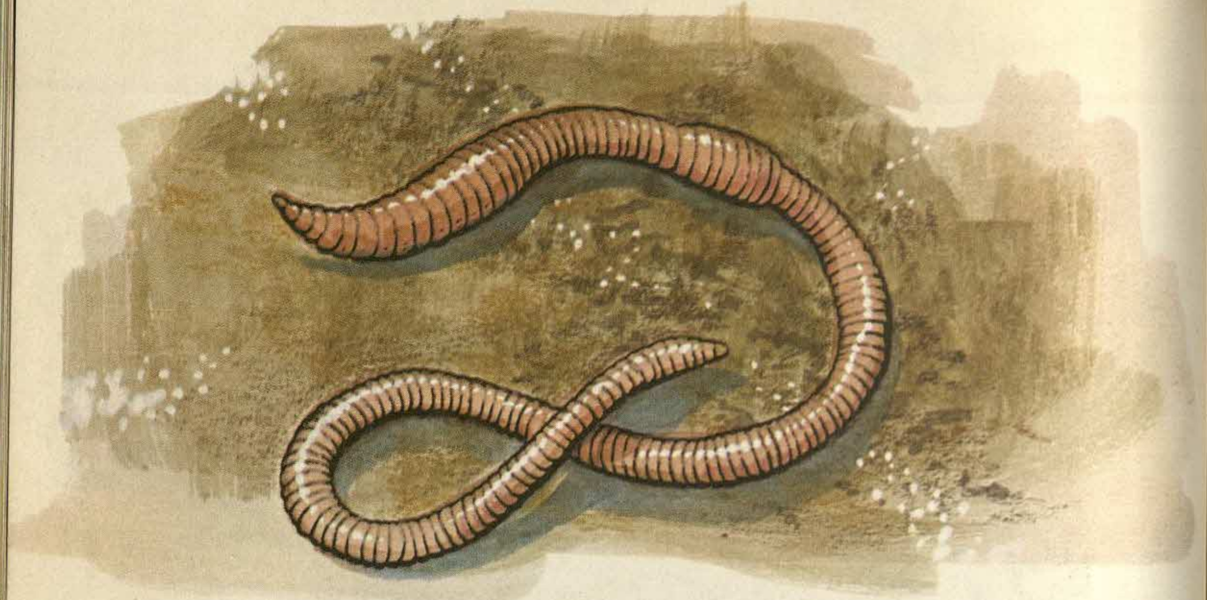
If you live by the sea coast, you can collect some of these animals for class study.

What kind of water will you need? What will you need in the bottom of the tank? Don't forget to supply air to the tank.

What animals can you collect?

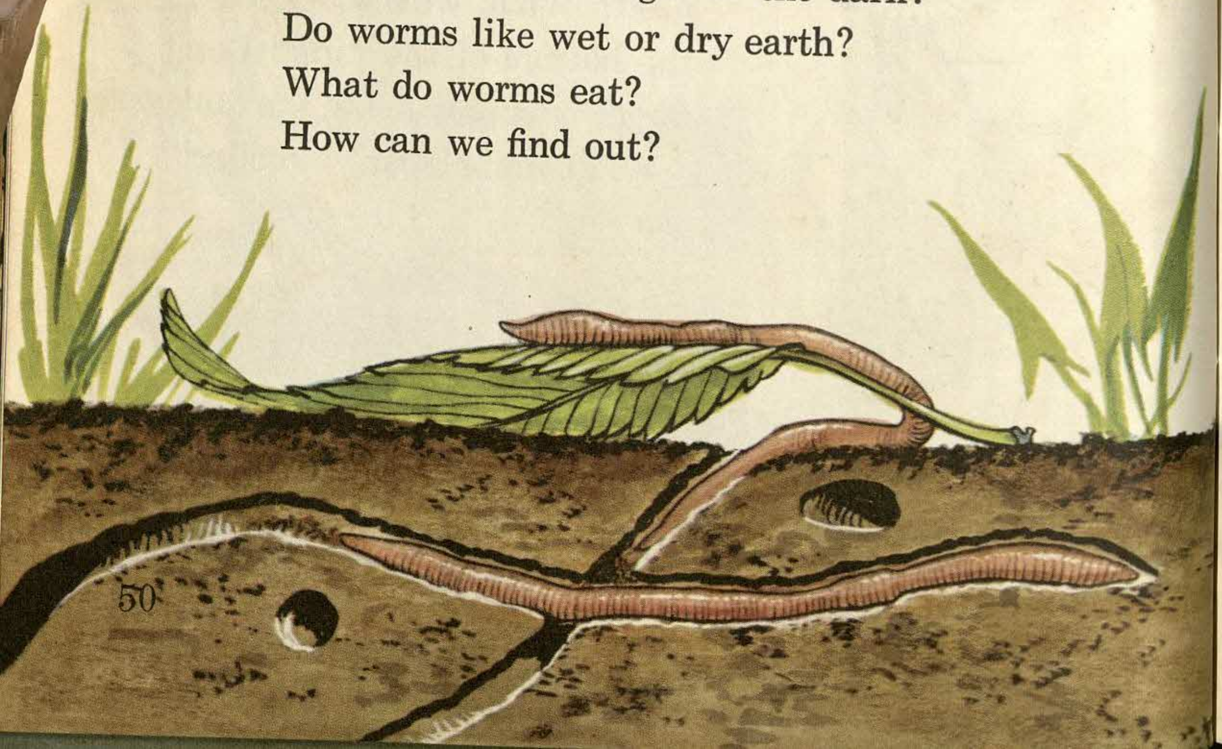


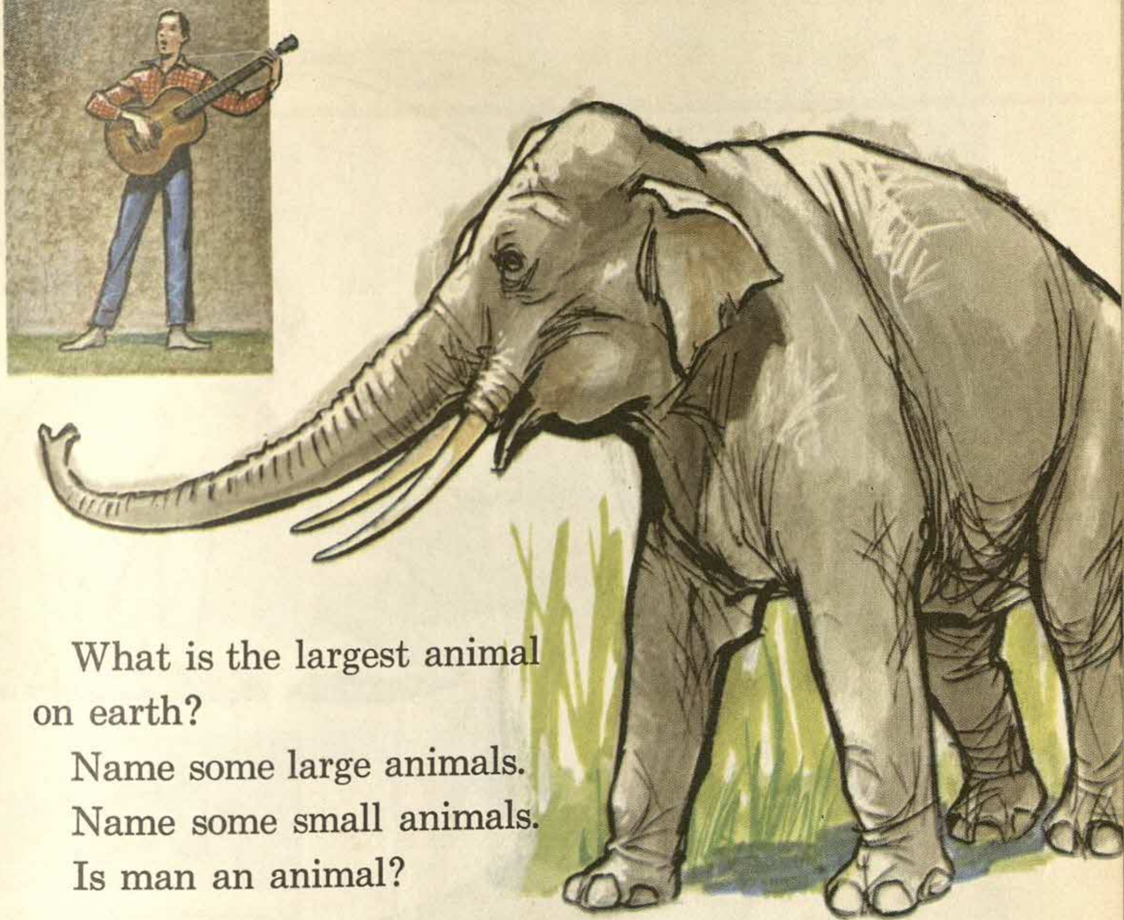




What Do You Think?

Do worms see?
Do worms hear?
How does a worm move?
Can they turn over?
Do worms like the light or the dark?
Do worms like wet or dry earth?
What do worms eat?
How can we find out?



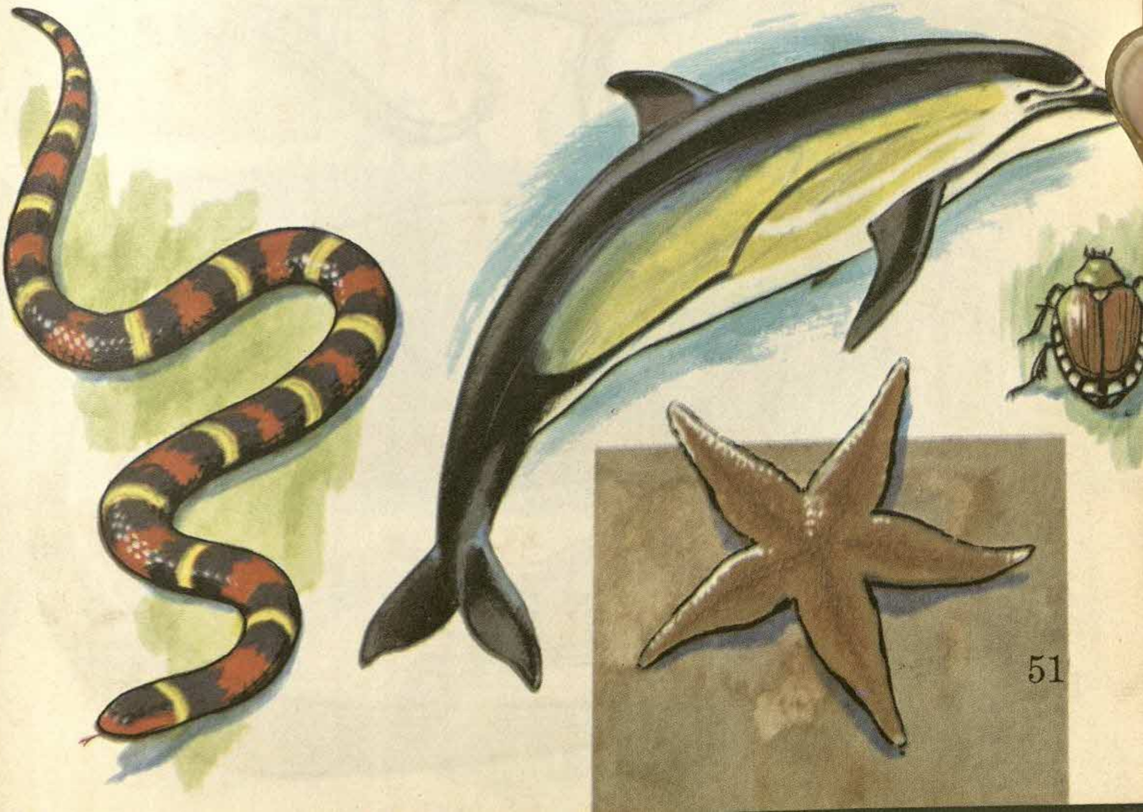


What is the largest animal on earth?

Name some large animals.

Name some small animals.

Is man an animal?



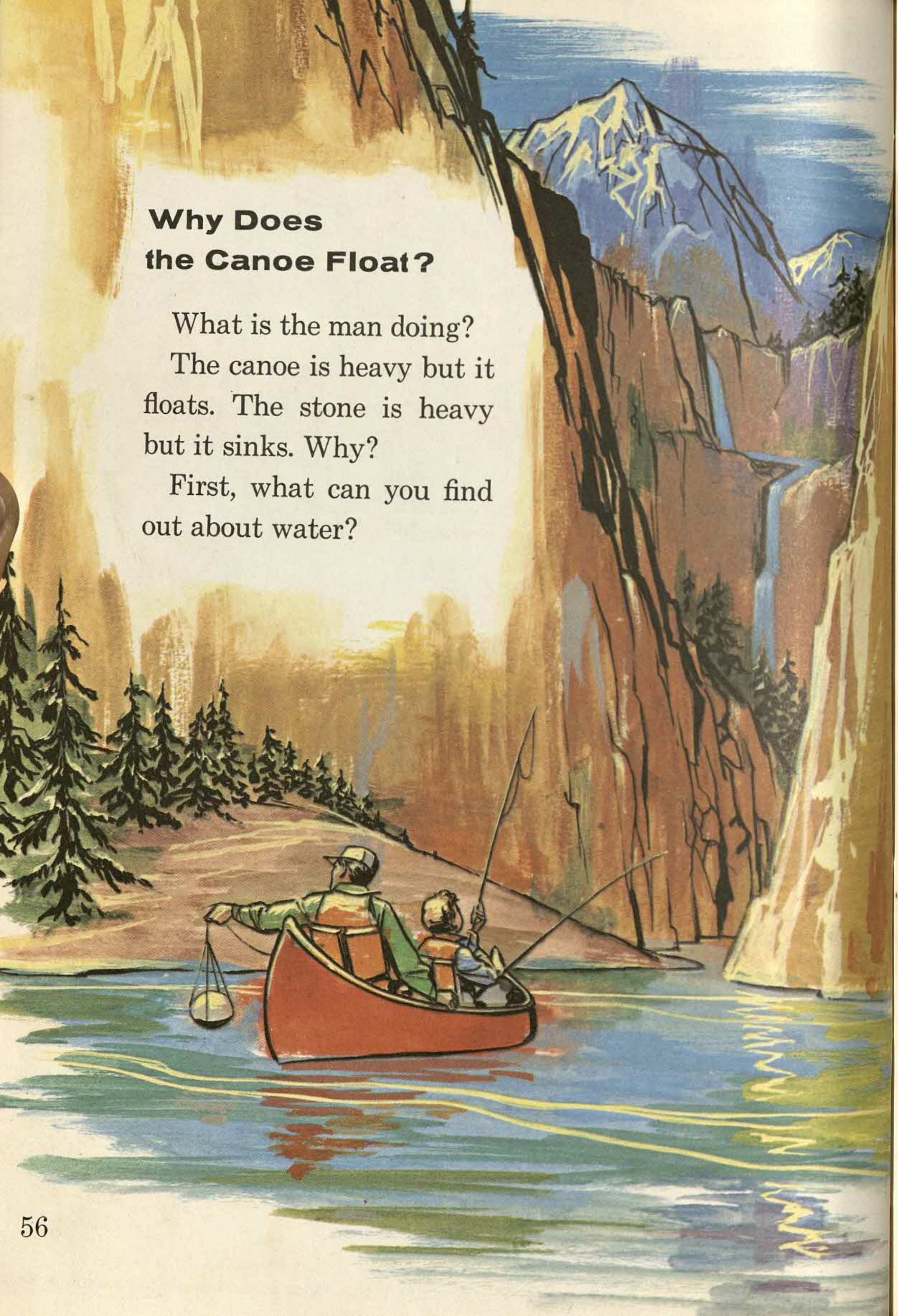
Water And Air

Why Does the Canoe Float?

What is the man doing?

The canoe is heavy but it floats. The stone is heavy but it sinks. Why?

First, what can you find out about water?



What Can You Find Out About Water?

Hold a clean glass up to the light. What is its color?

Fill the glass with water and look at it. What is the color of the water?

Smell the water. Taste the water. Feel the water with your fingers. What can you tell about this water?

Can you pick the water up? What must you do?

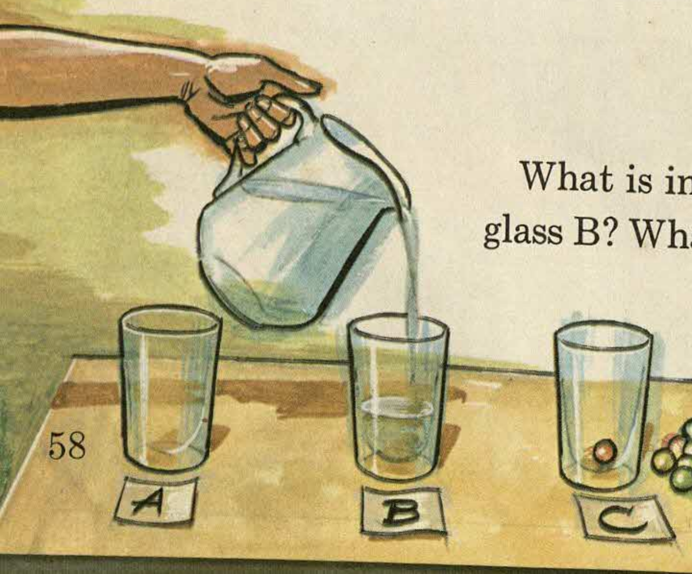
What Is Water?

Here is a cup that is used for measuring. Fill it with water. How much water do you have?

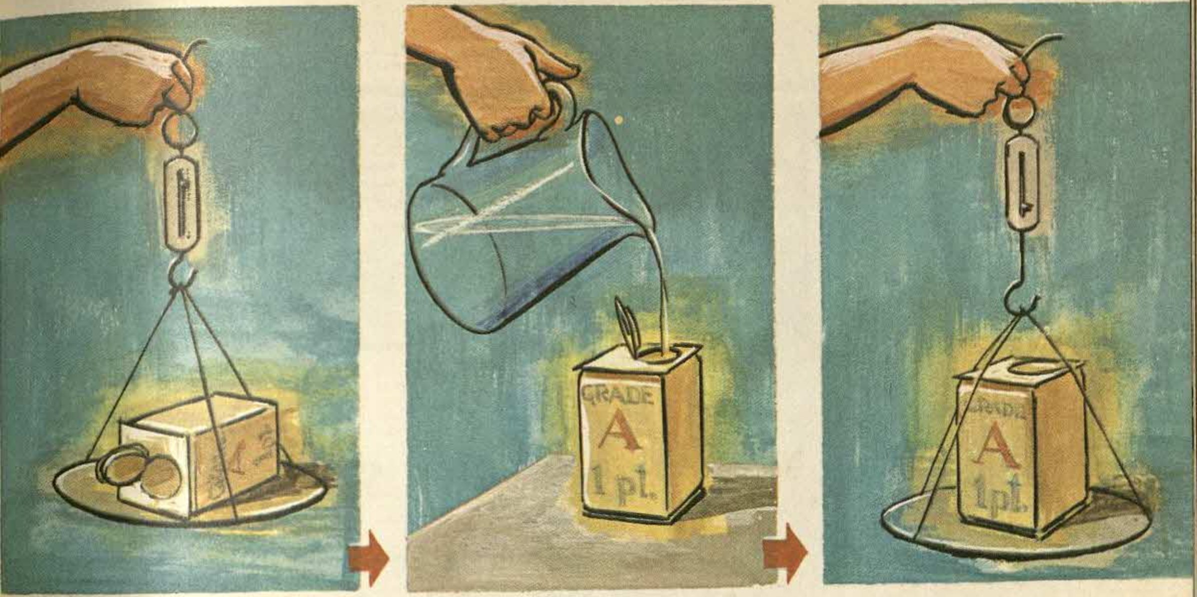
Here are three bottles. Pour a cup of water into each bottle. How much water do you have in each bottle? What shape does the water have?

A liquid is something that has no shape of its own, but the space it takes up can be measured.

What is water?



What is in glass A? What is in glass B? What is in glass C?

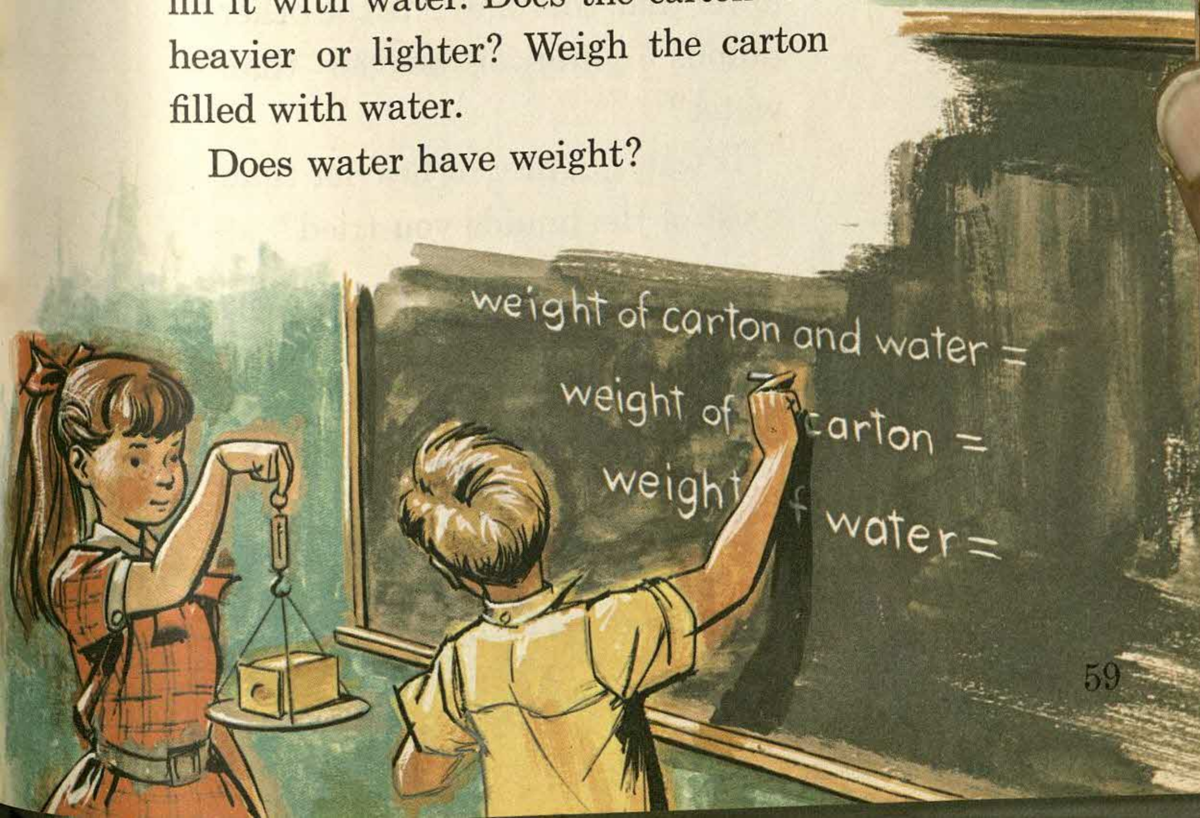


Does Water Have Weight?

Water takes up space. Does water have weight? Weigh some and see.

Take a pint carton and weigh it. Now fill it with water. Does the carton feel heavier or lighter? Weigh the carton filled with water.

Does water have weight?

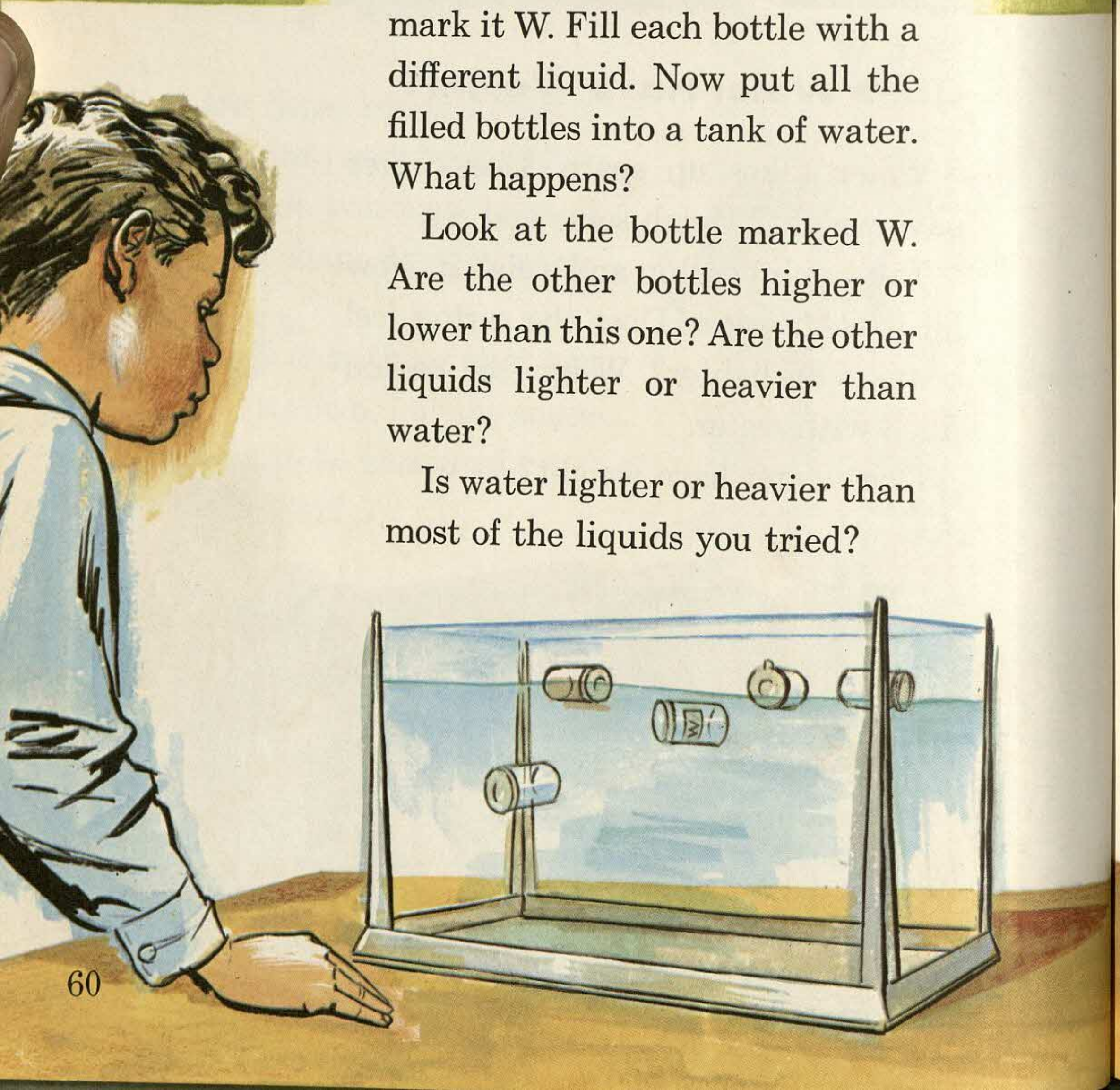


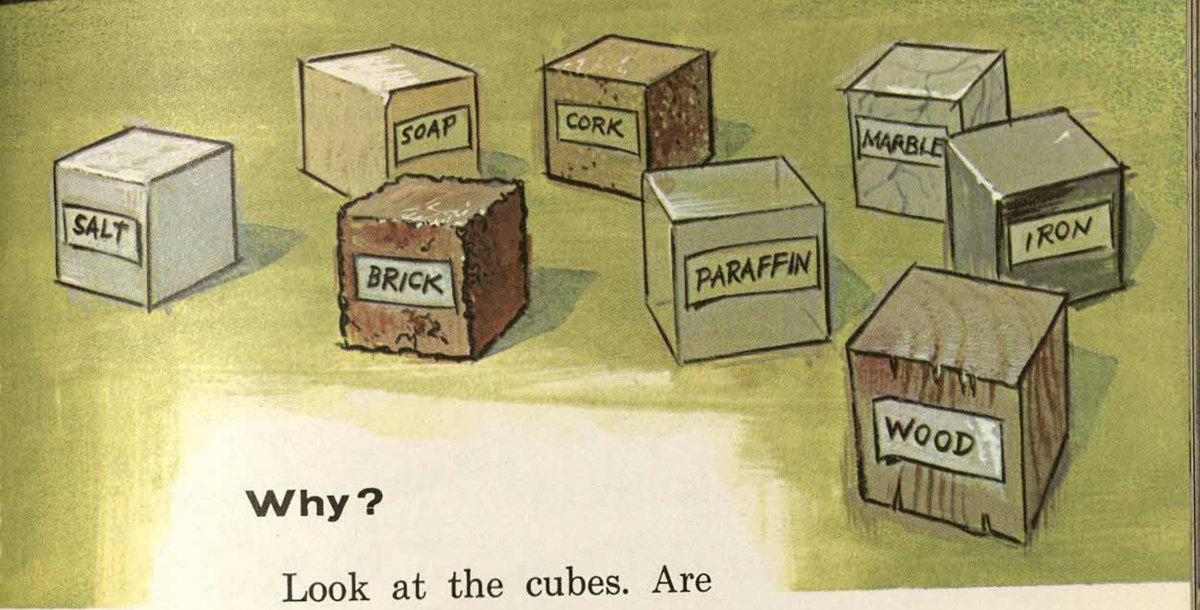
What Happens?

Fill one bottle with water and mark it W. Fill each bottle with a different liquid. Now put all the filled bottles into a tank of water. What happens?

Look at the bottle marked W. Are the other bottles higher or lower than this one? Are the other liquids lighter or heavier than water?

Is water lighter or heavier than most of the liquids you tried?

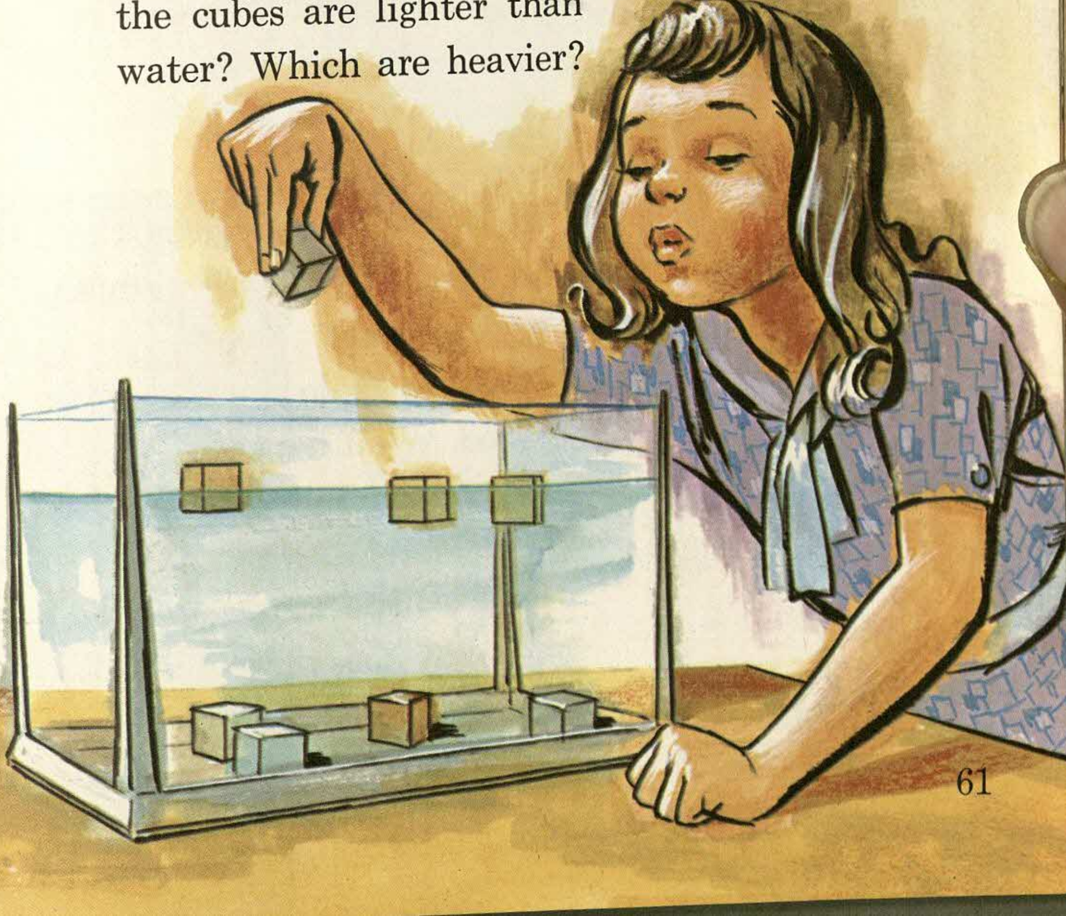


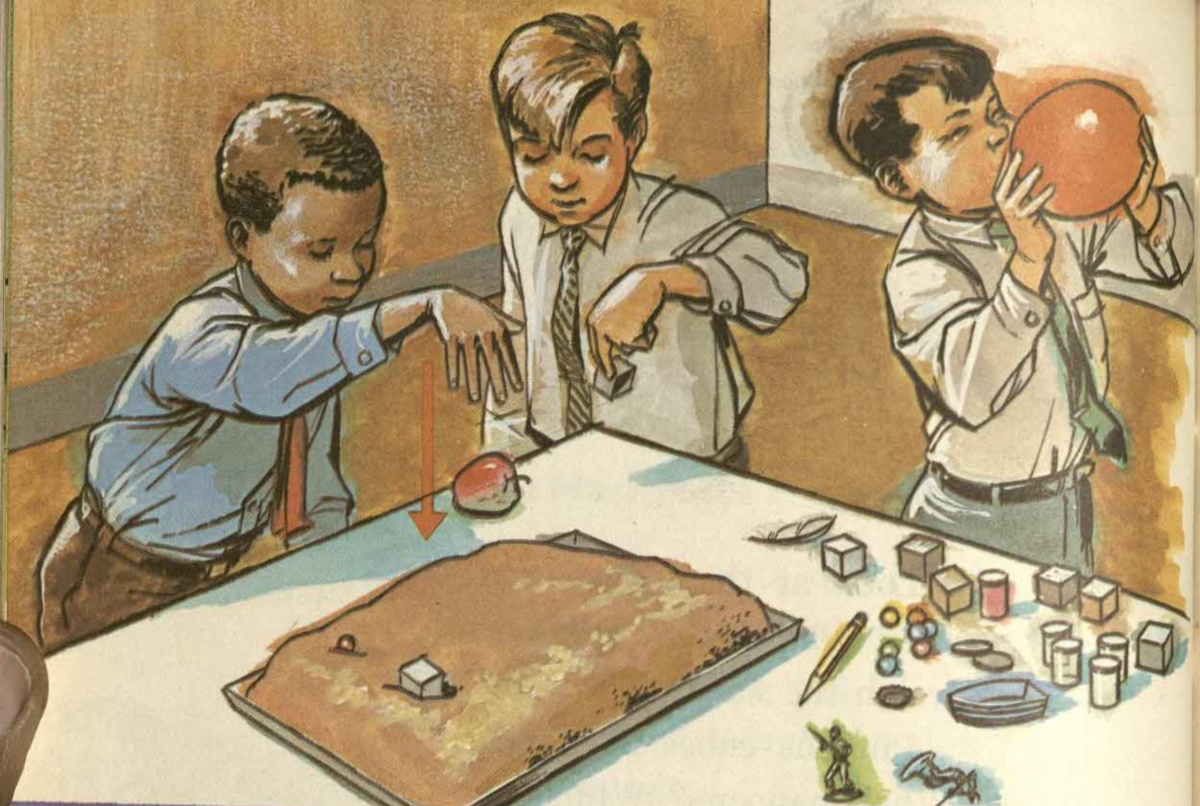


Why?

Look at the cubes. Are they alike in size? Do they weigh the same?

Put the cubes in water. What happens? Which of the cubes are lighter than water? Which are heavier?





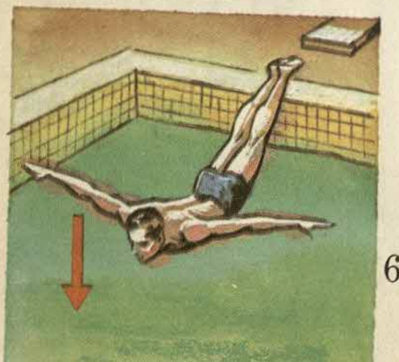
Drop It!

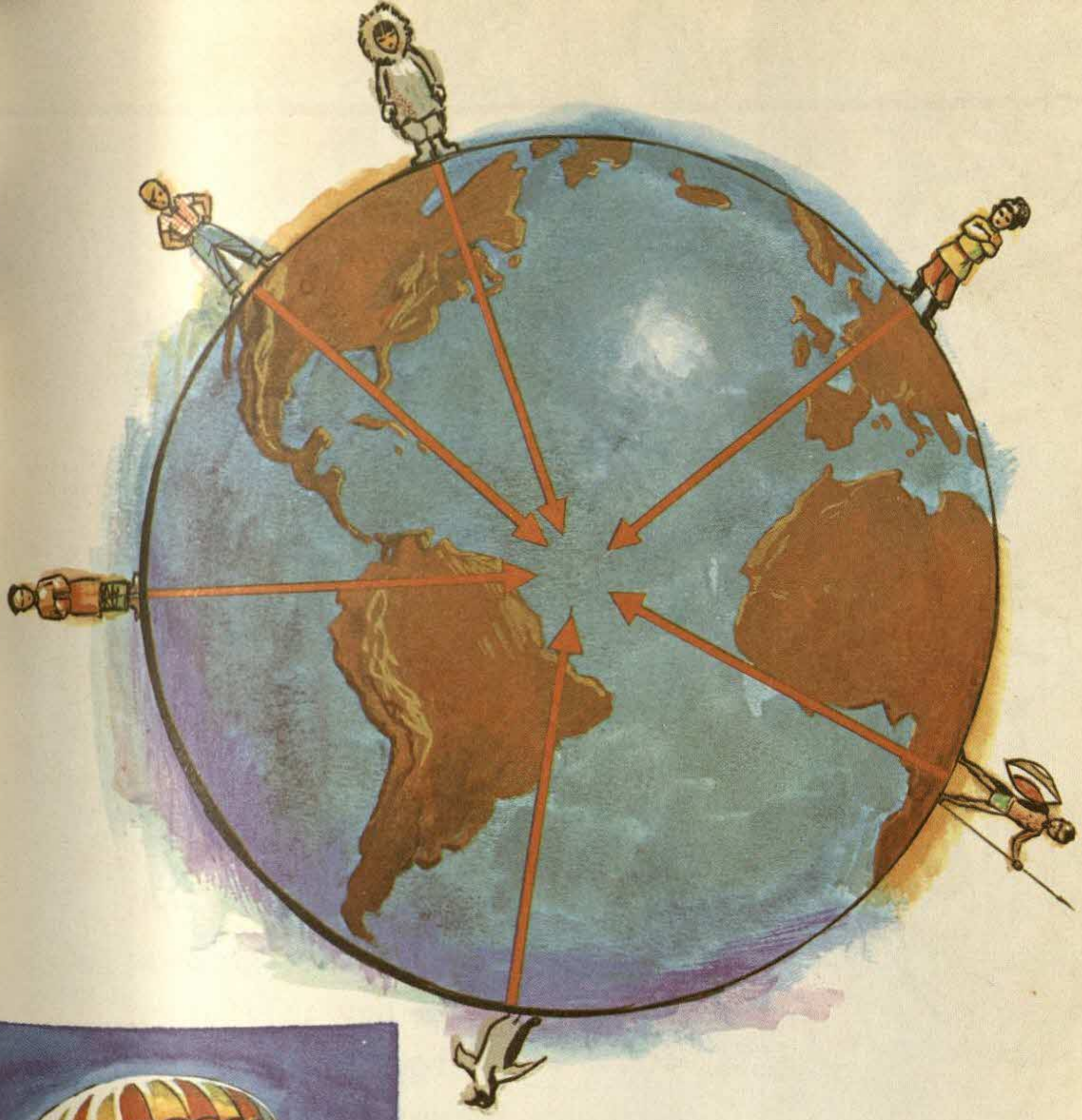
Hold the marble over the sand table. Drop the marble. What happens?

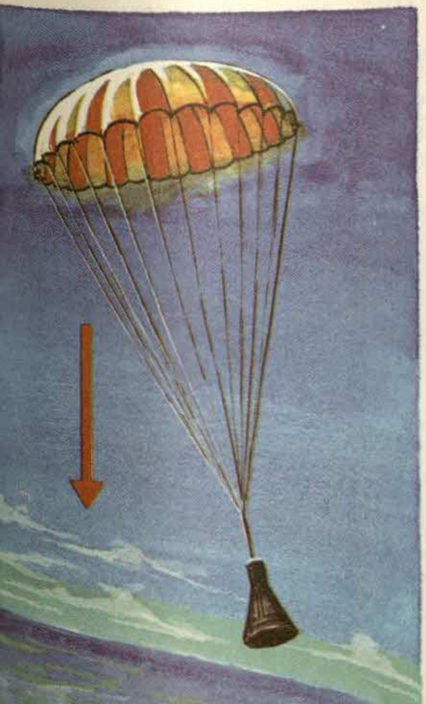
Drop the apple and the cube of wood. What happens?

Drop each thing. What do you find out?

Pour a little water onto the sand. Why does the water fall?



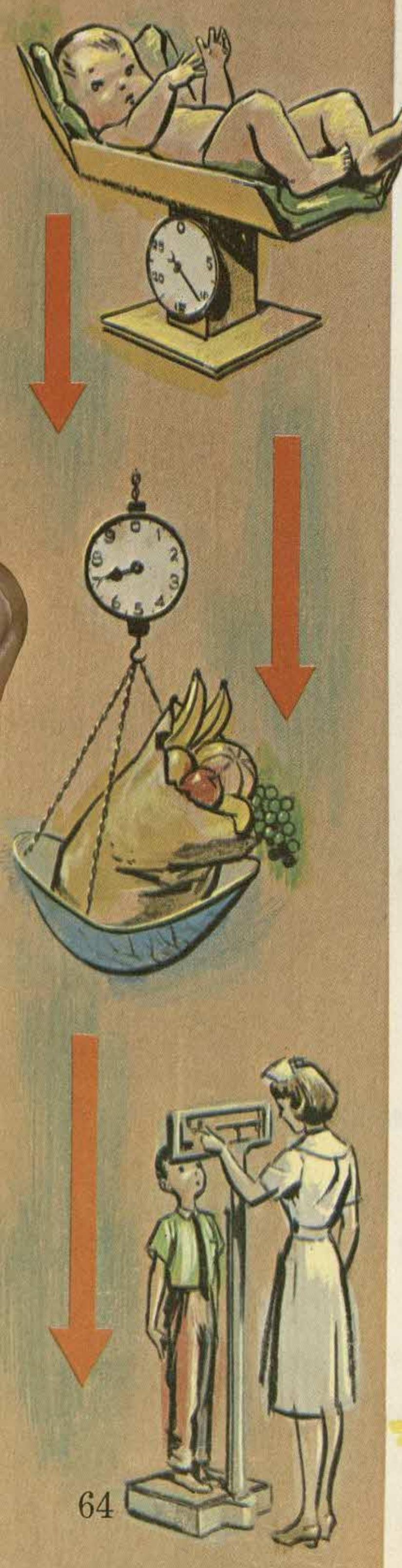




Why Do Things Come Down?

Where is down for each one? Where is up? Are you surprised?

The earth pulls objects down to it. The pull of the earth is called gravity.



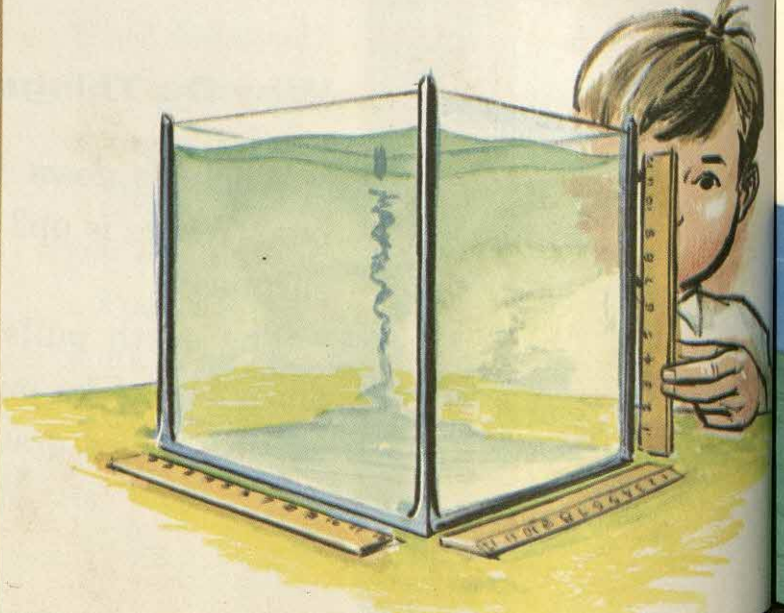
Does Air Have Weight?

Weight tells us how much the earth pulls on an object.

Weight is a measure.

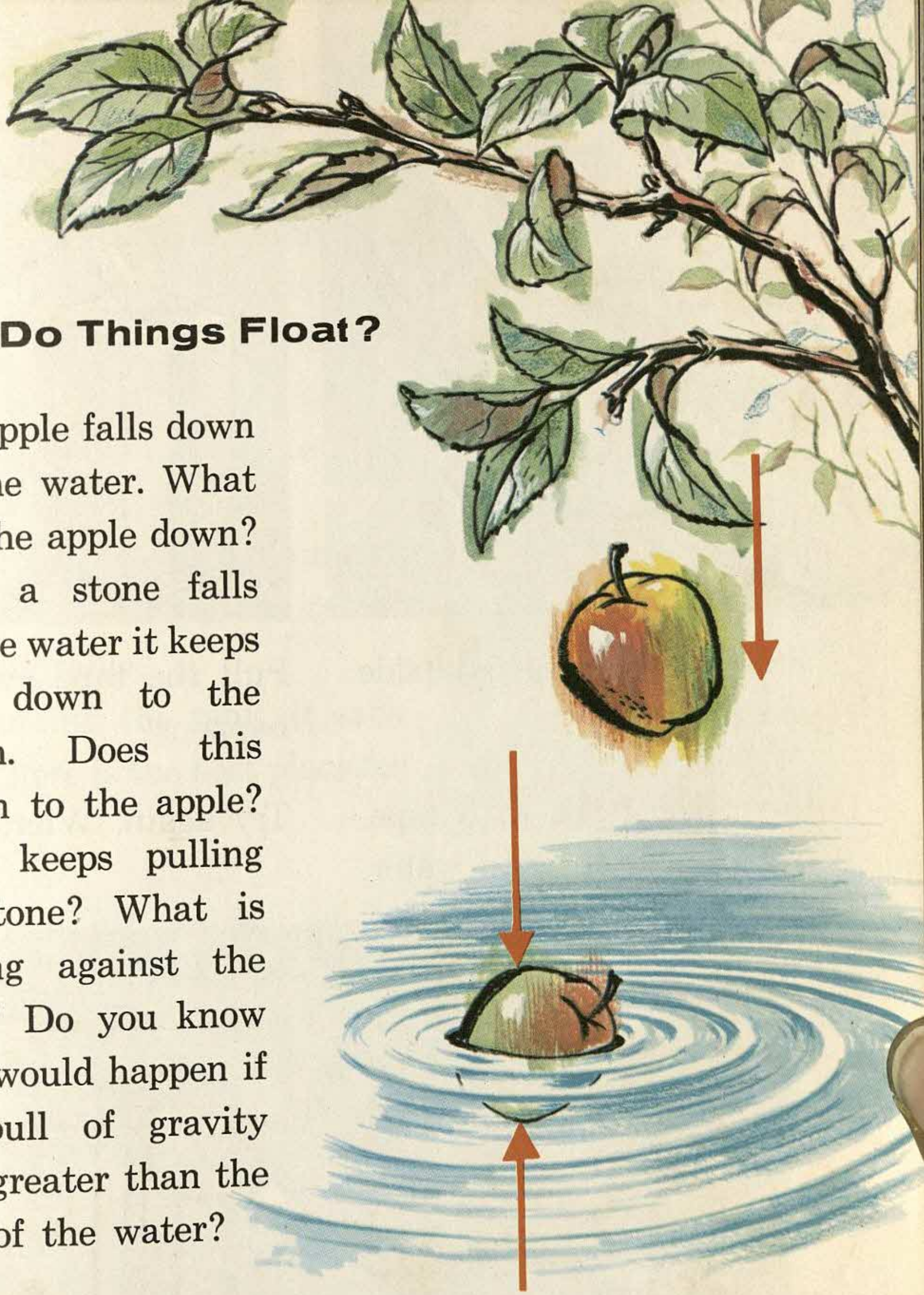
Weight measures the pull of gravity.

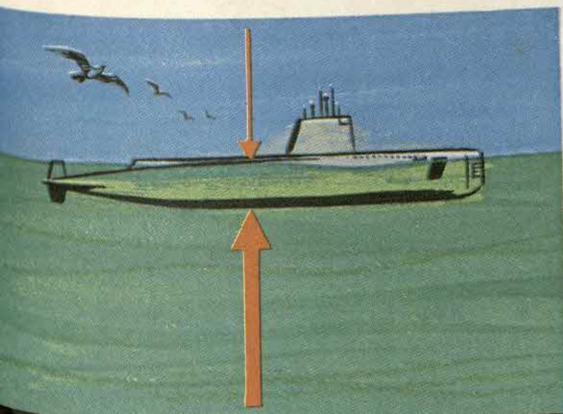
How could you weigh the water in the tank?

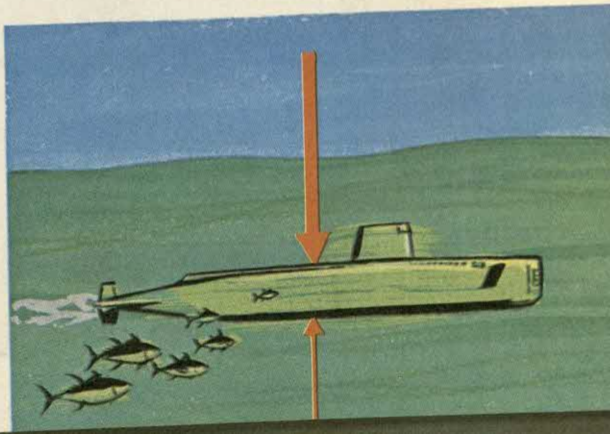


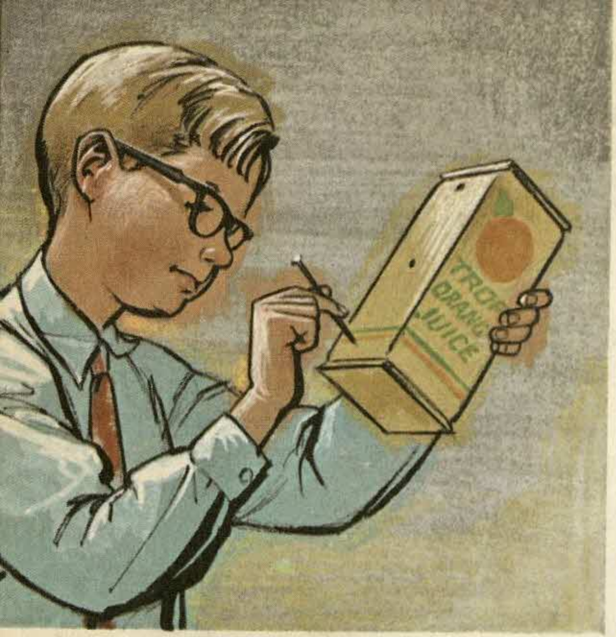
Why Do Things Float?

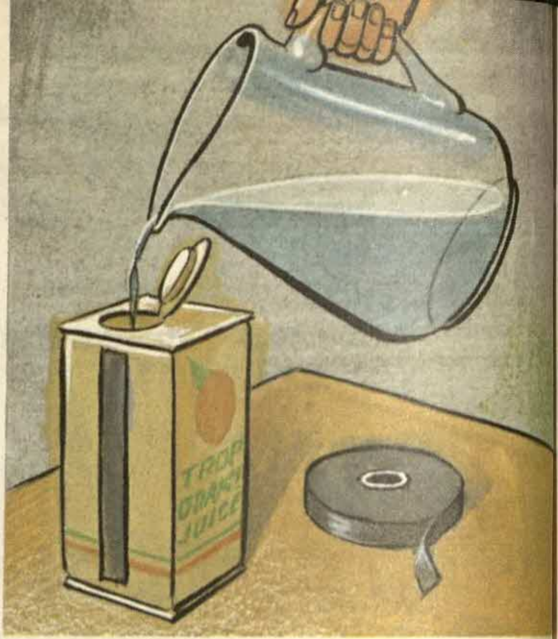
An apple falls down into the water. What pulls the apple down? When a stone falls into the water it keeps going down to the bottom. Does this happen to the apple? What keeps pulling the stone? What is pushing against the apple? Do you know what would happen if the pull of gravity were greater than the push of the water?









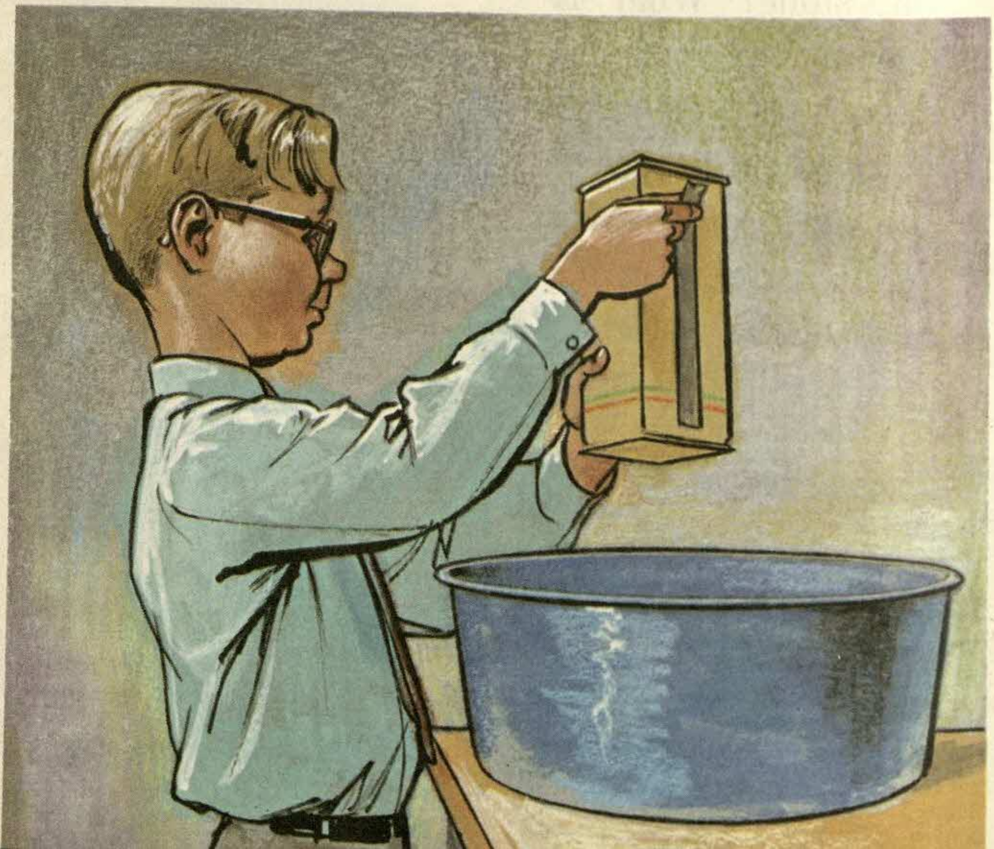


Punch three holes in the side of the carton.

Cover the holes with tape. Fill the carton with water.

Pull the tape away. What happens?

Try again. What happens?



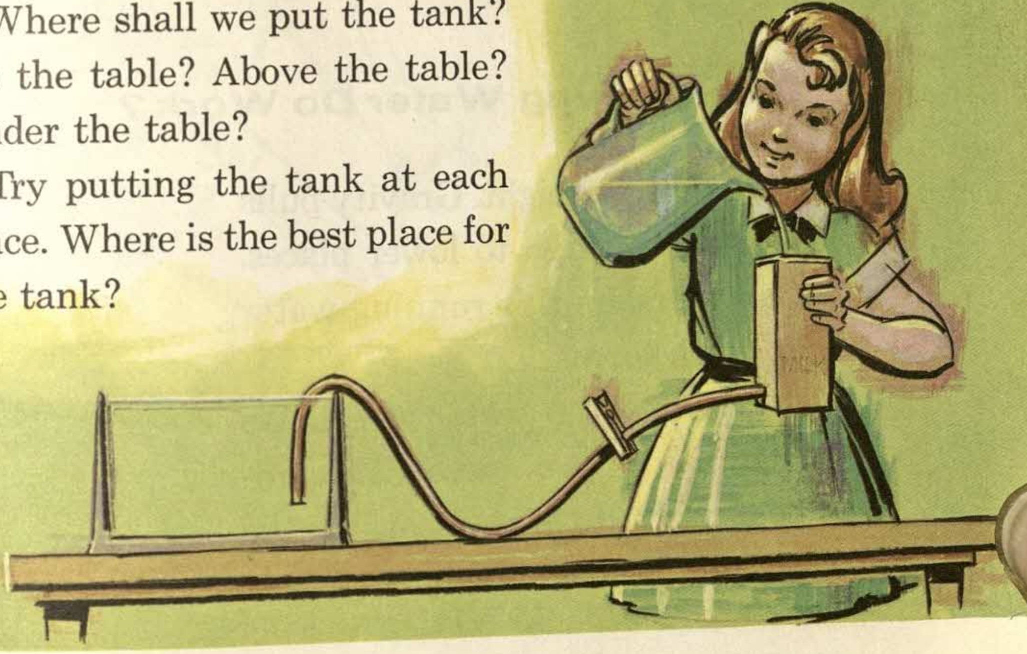
Running Water

The carton is a tank of water. The rubber hose is a pipeline. The aquarium is a house. The clamp is a valve that can be opened and closed.

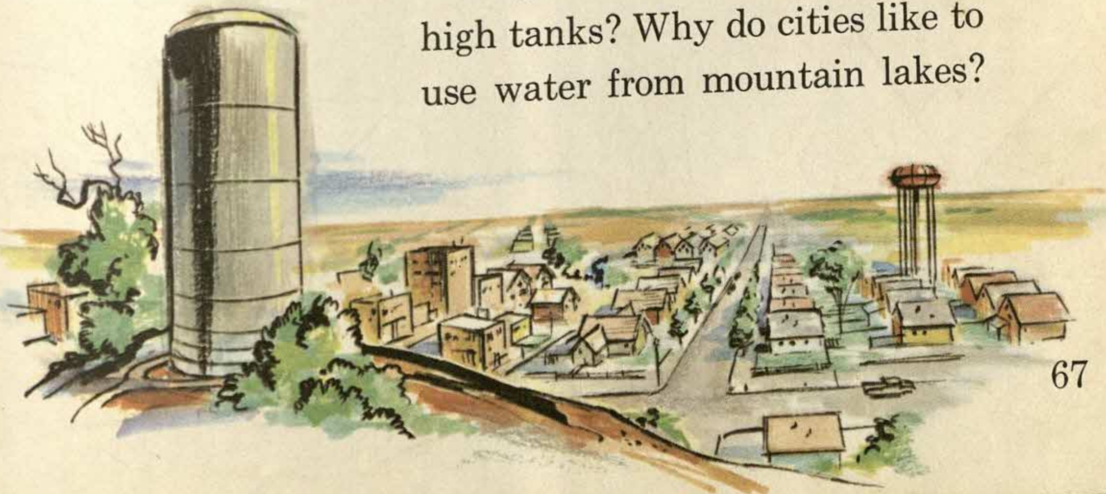
Fill the tank with water. Be sure the valve is closed.

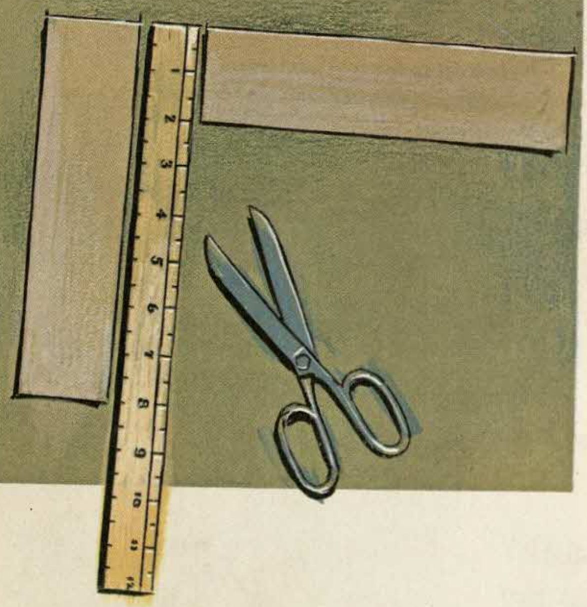
Where shall we put the tank? On the table? Above the table? Under the table?

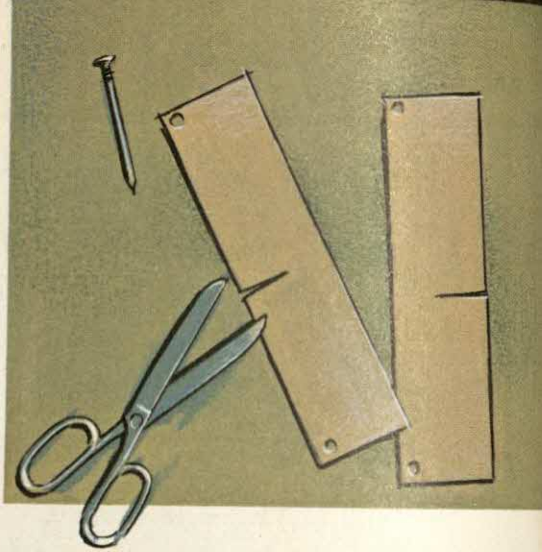
Try putting the tank at each place. Where is the best place for the tank?



Why do towns keep water in high tanks? Why do cities like to use water from mountain lakes?



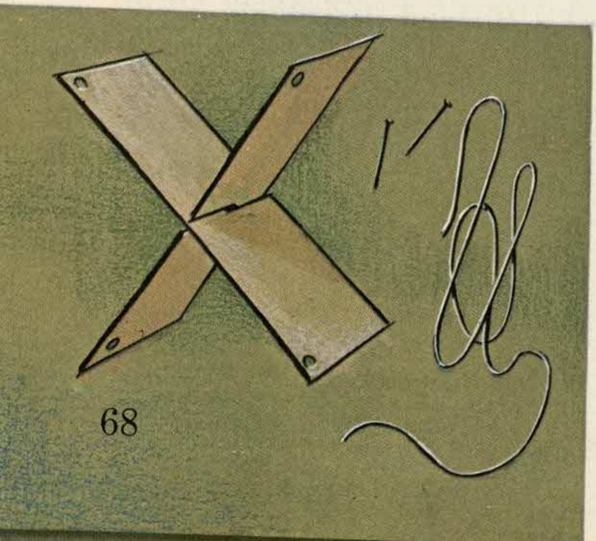


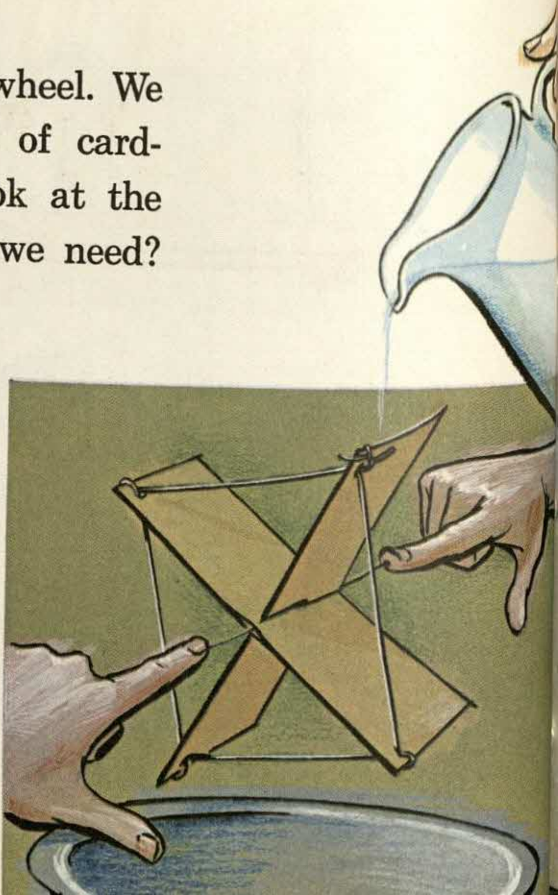


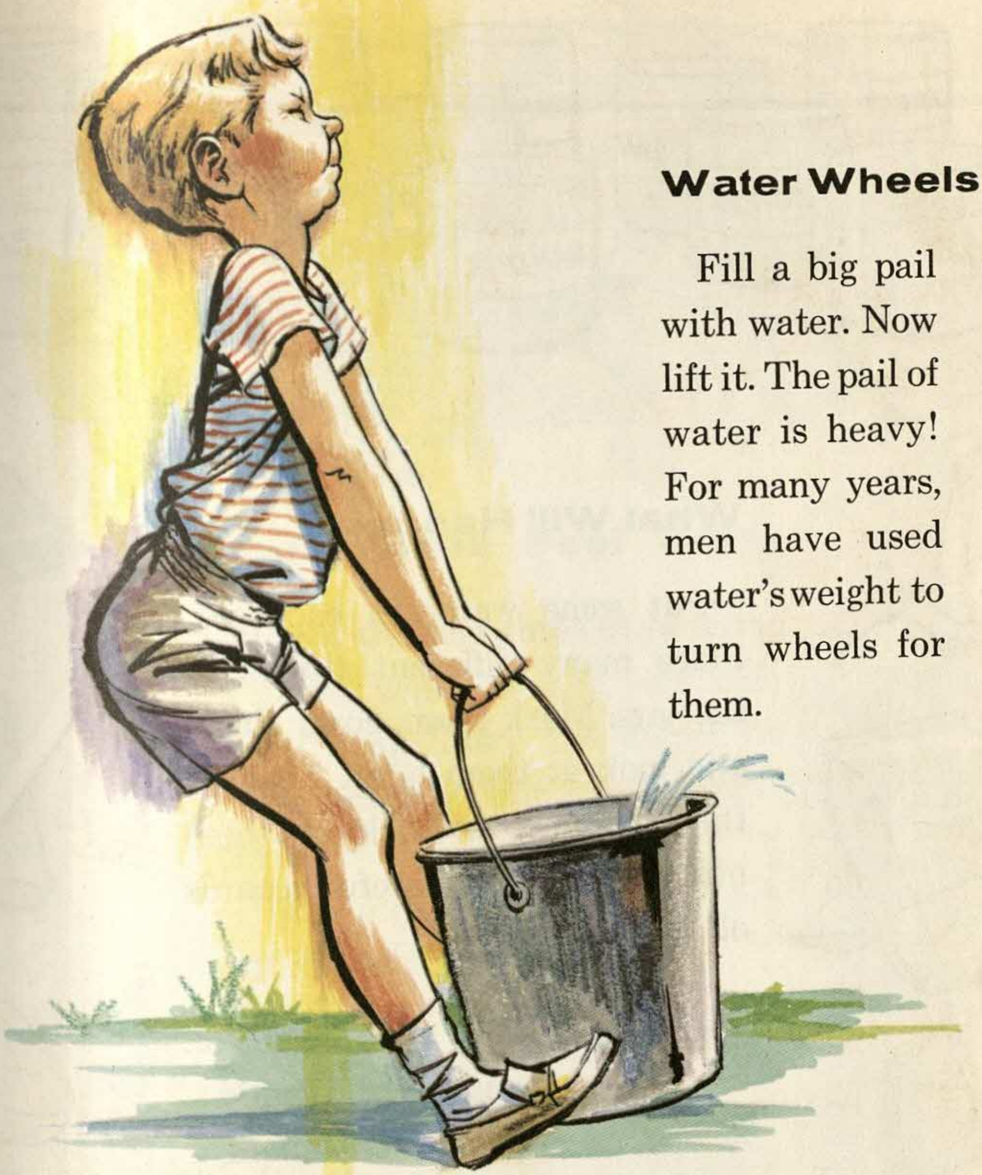
Can Running Water Do Work?

Water has weight. Gravity pulls water from high to lower places. Can we make this running water do work for us?

Let's make a water wheel. We shall need two pieces of cardboard, cut to size. Look at the picture. What else do we need?



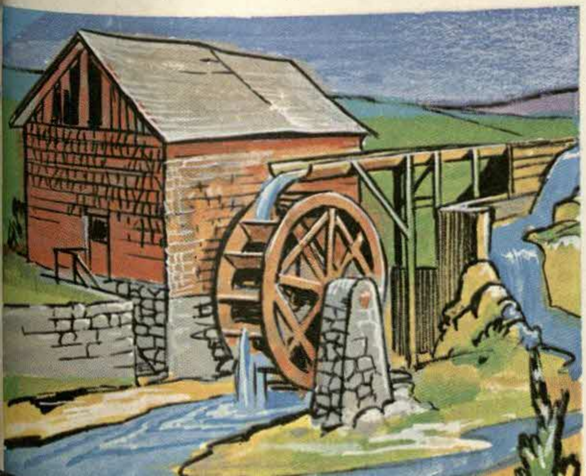


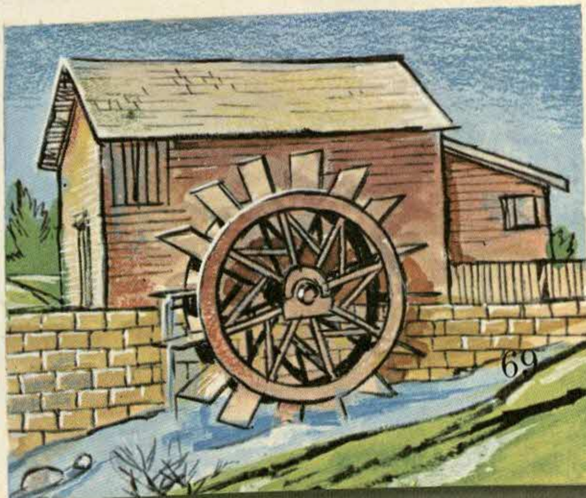


Water Wheels

Fill a big pail with water. Now lift it. The pail of water is heavy! For many years, men have used water's weight to turn wheels for them.

Look at the pictures. How does the water turn each wheel?

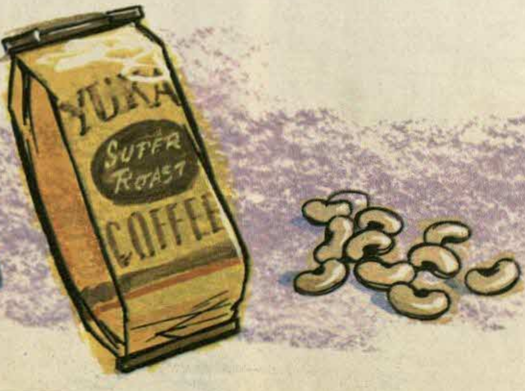




What Will Happen?

Put some water in each jar. Place many different things in the jars. Mark them, cover them, and look at them later. Look at them tomorrow. Look at them next week. Keep careful records of all that you see.

a little:	some:	a piece of:
salt	beans	candy
sugar	marbles	chalk
sand	tacks	soap
ink	coffee	carrot
oil	wood	rock



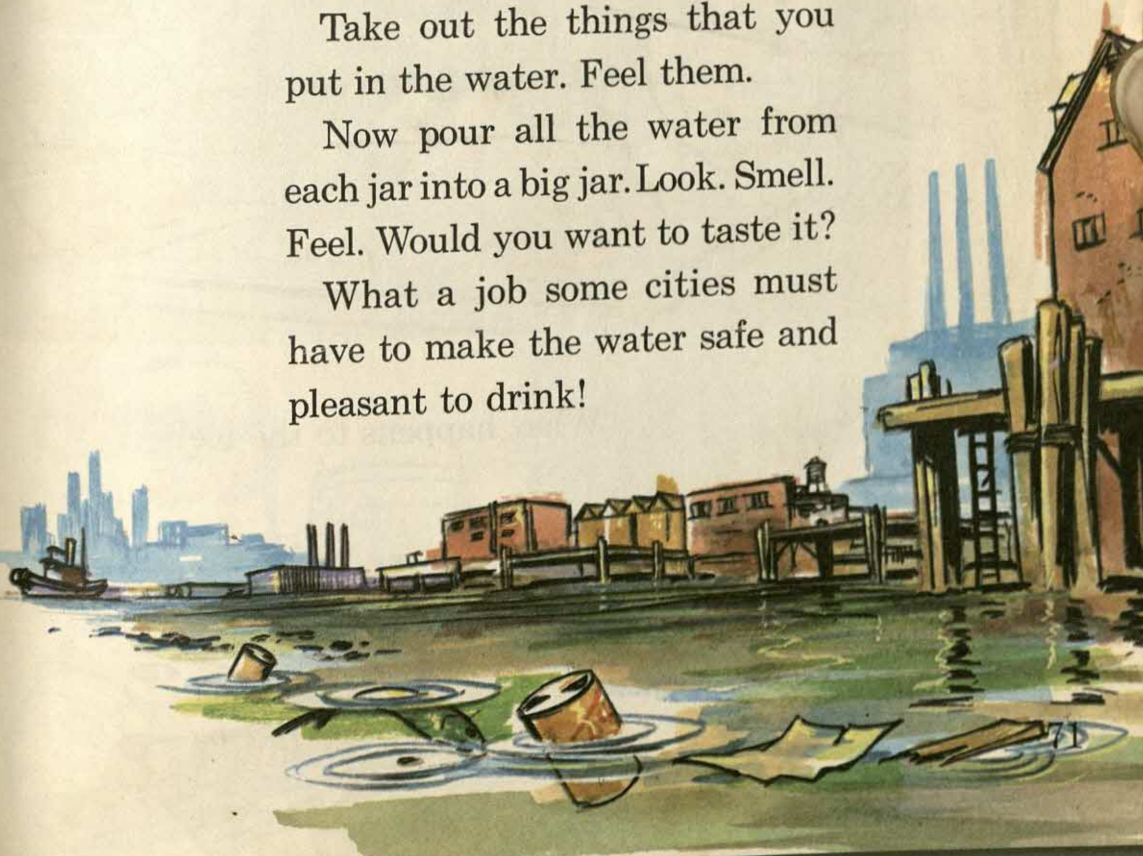
Look Smell Feel Taste

Open the jars three days later. Test the water in each jar: look, smell, feel. Taste the water in these jars only: salt, sugar, candy, carrot.

Take out the things that you put in the water. Feel them.

Now pour all the water from each jar into a big jar. Look. Smell. Feel. Would you want to taste it?

What a job some cities must have to make the water safe and pleasant to drink!

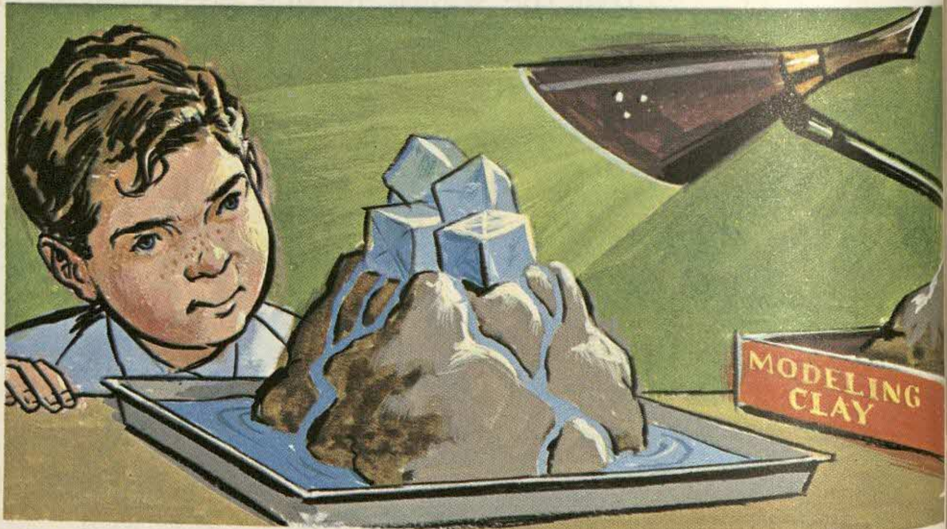


High Up

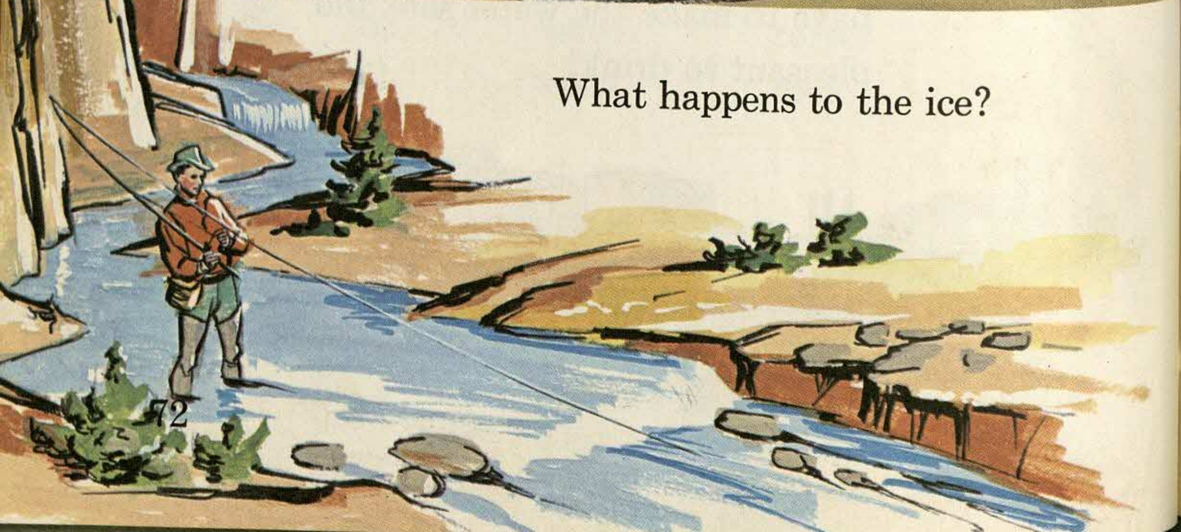
Why are mountain tops white?

What happens when the sunlight shines on ice and snow?

Let's make a mountain with ice on the top. We shall need some ice cubes, clay, and a big pan. A lamp can be our sun.



What happens to the ice?



What Do You Think?

Why do things come down?

Which way is down?

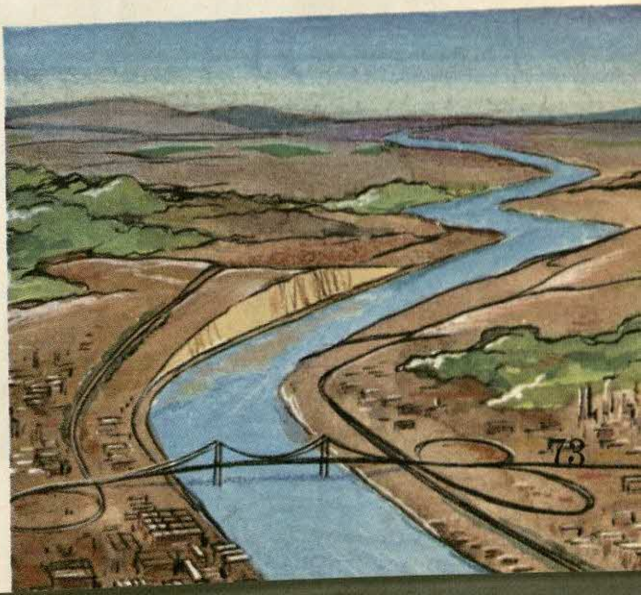
What is weight?

Why do things float?

Does salt seem to disappear faster in warm water or in cold water?

What happens when you put hard candy in water?

Why do rivers move?



Look Around

Can you see air?

Try to catch a handful of air. Can you feel air?

Is air all around you?

Where Is Air?

Place a dry sponge into the water. Do this quickly. Where do the bubbles come from? Is there air in a sponge?

Drop a lump of soil into the water. What do you see? Is there air in soil?

Drop some sugar into the water. What do you see? Is there air in sugar?

Put the plant in the water. Look carefully. Is there air in plants?

Now put a glass of cold water on a shelf in your room. Look at it from time to time. What do you see? Is there air in water?

Do you think air is everywhere?

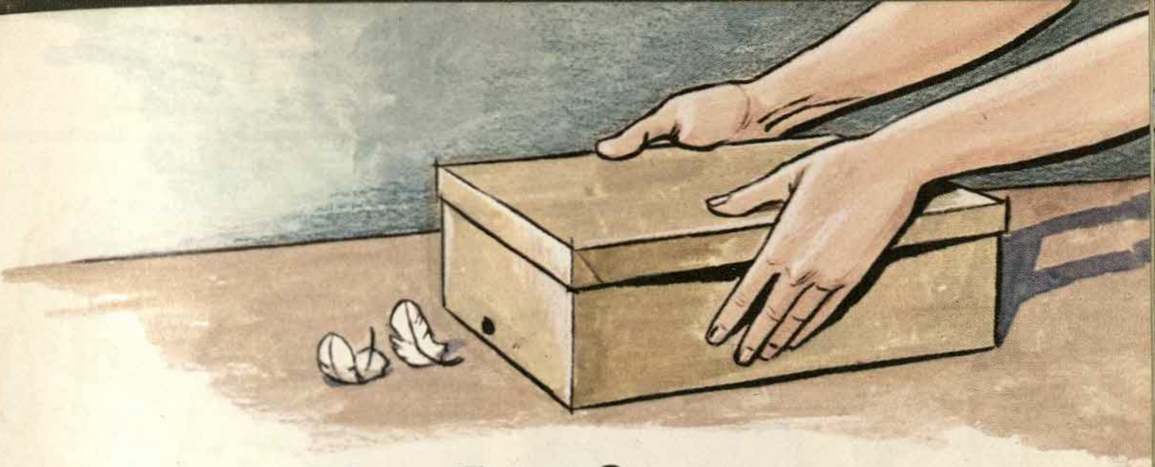
What Shape Is Air?

Fill a balloon with air. Hold the opening closed with your hand. Push in the balloon. What do you feel?

Squeeze the balloon. Why does the balloon take on different shapes?

Now let the air out of the balloon against your hand. Can you feel the air?

What shape is air?



Does Air Have Force?

Cut a hole in one end of a cardboard box.

Squeeze the sides of the box. What do you feel coming through the hole?

Does air move bits of paper? Does air have force?

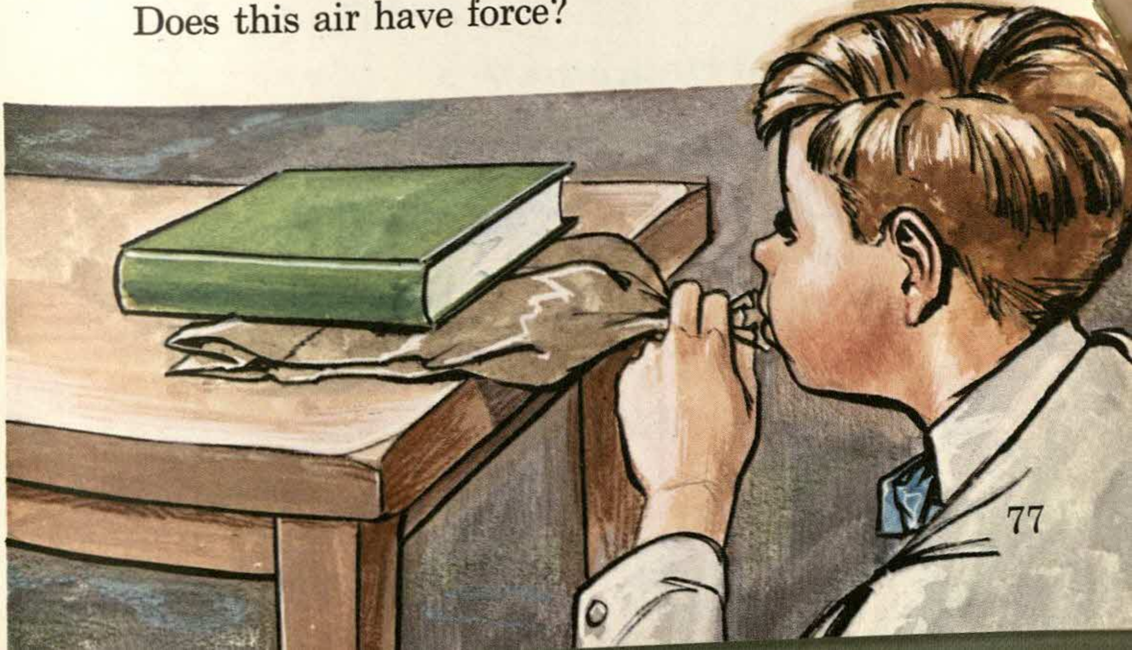
Smooth a paper bag. Put it near the edge of a table.

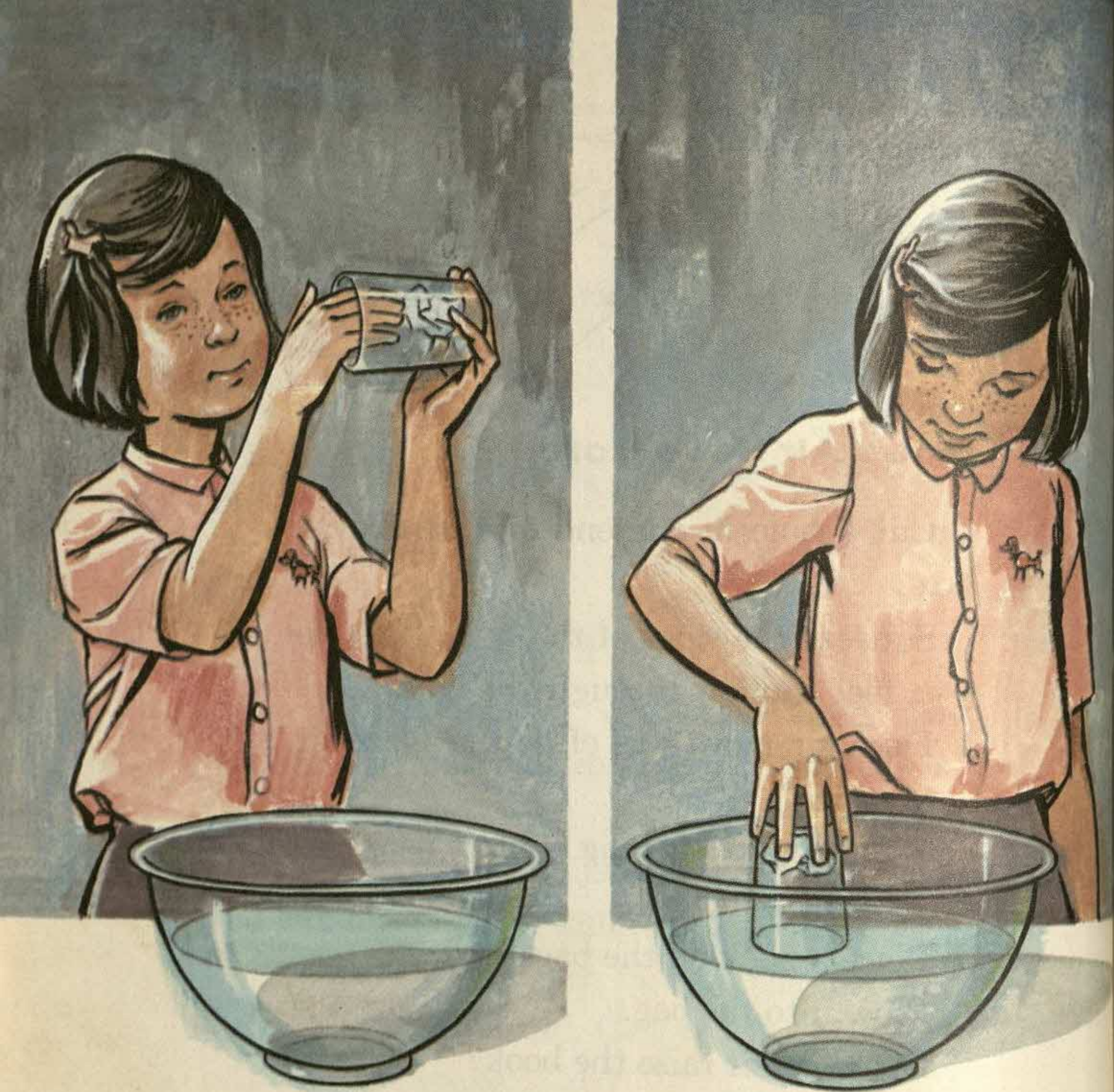
Place a book on the bag.

Blow into the bag.

Does the air raise the book?

Does this air have force?





What Happens?

Take a piece of dry paper and place it in the bottom of a dry glass. Make sure the paper cannot fall out.

Turn the glass upside down. Push the glass into a bowl of water. Does the paper get wet? Why?

Can you explain what happens?

More About Air

Blow up two balloons to about the same size. Balance them on a yardstick.

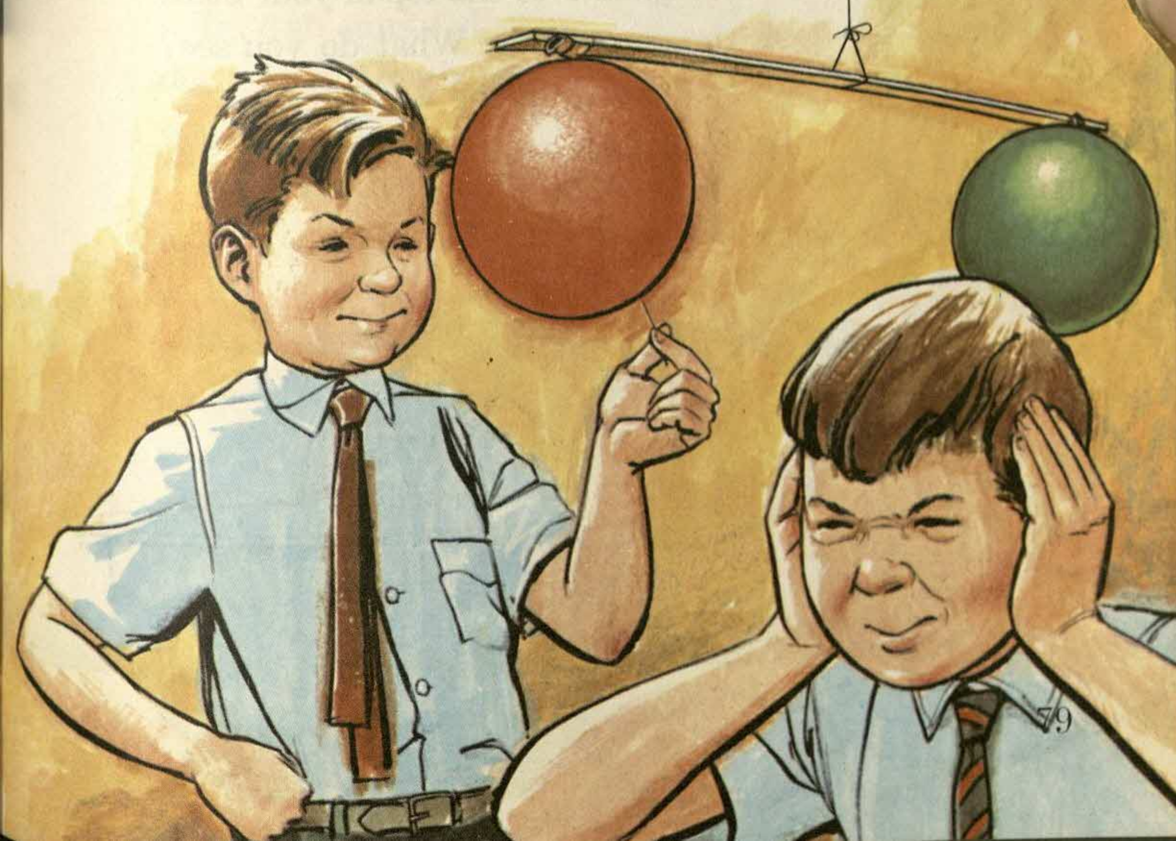
Break one balloon with a pin.

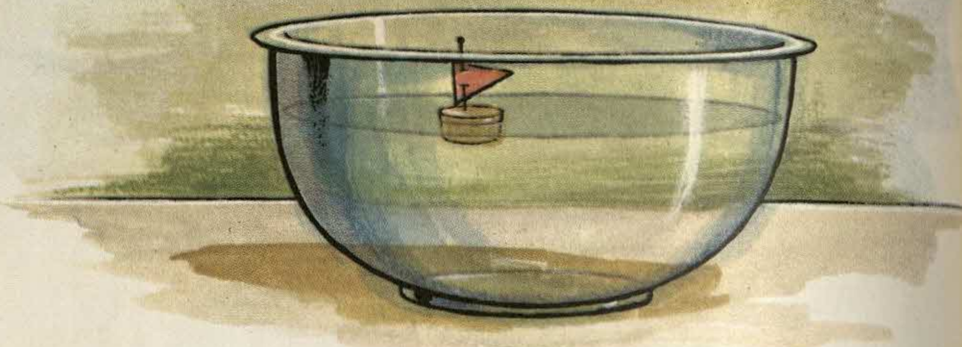
Why does the yardstick tip? Which end goes down? Can you explain what you have just observed?

Weigh a balloon before you blow it up. Record the weight in your notebook.

Blow up the balloon.

Weigh it again and record the weight. Is the balloon heavier or lighter now? What does this tell you about air?





What Do You See?

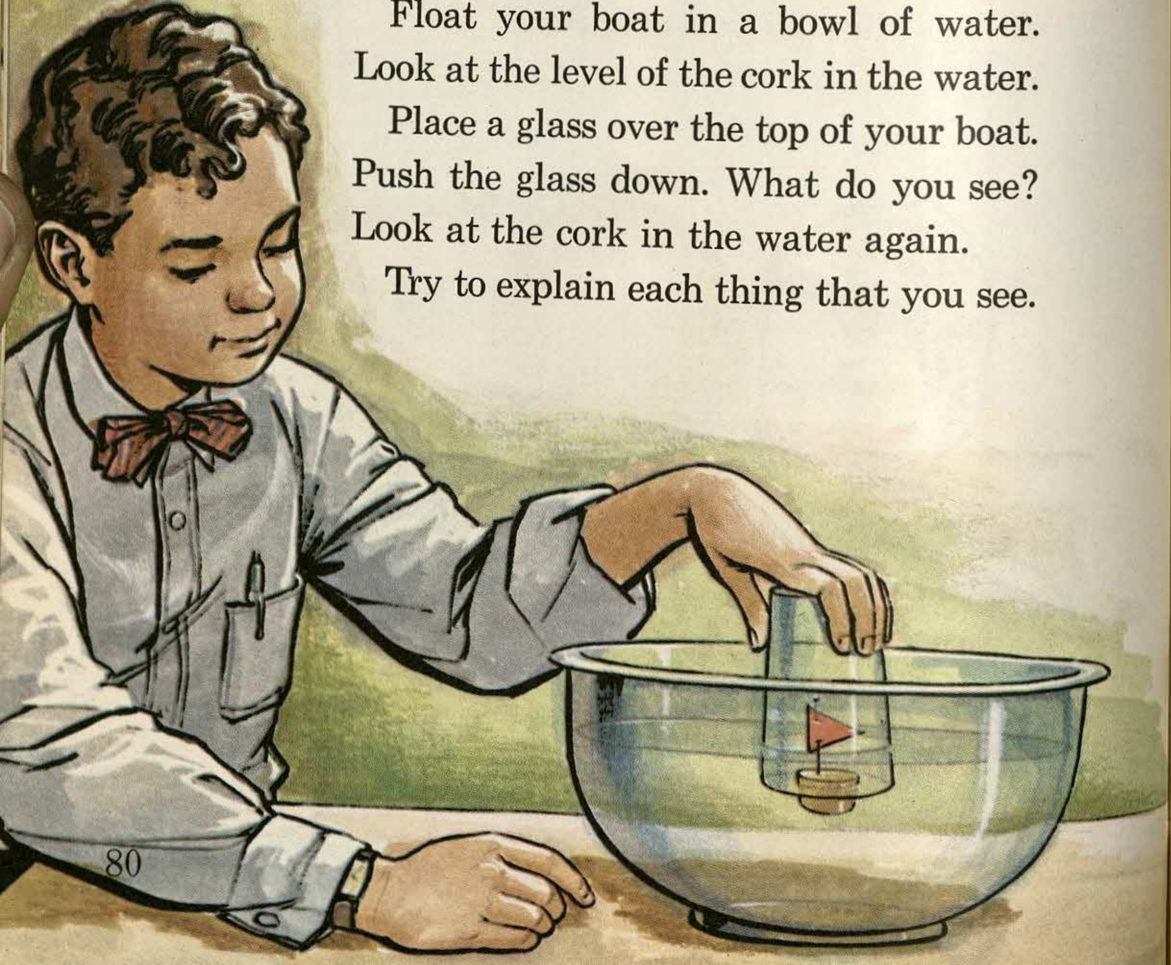
Make a small boat out of a cork, a piece of wire, and a small piece of paper.

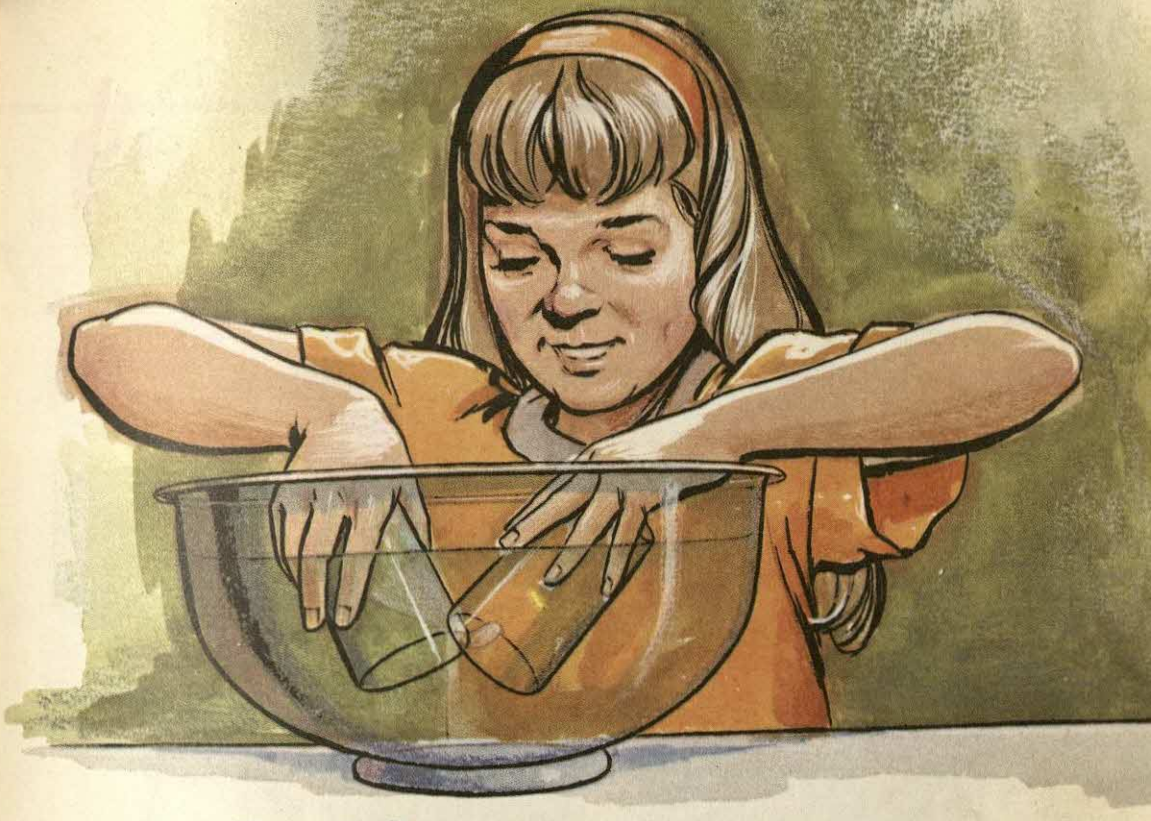
Put the wire into the cork to hold a paper sail.

Float your boat in a bowl of water. Look at the level of the cork in the water.

Place a glass over the top of your boat. Push the glass down. What do you see? Look at the cork in the water again.

Try to explain each thing that you see.





Is It Empty?

Take an empty glass and hold it upside down in a large bowl of water. What do you see?

Take another empty glass and hold it in the water. Let this glass fill with water.

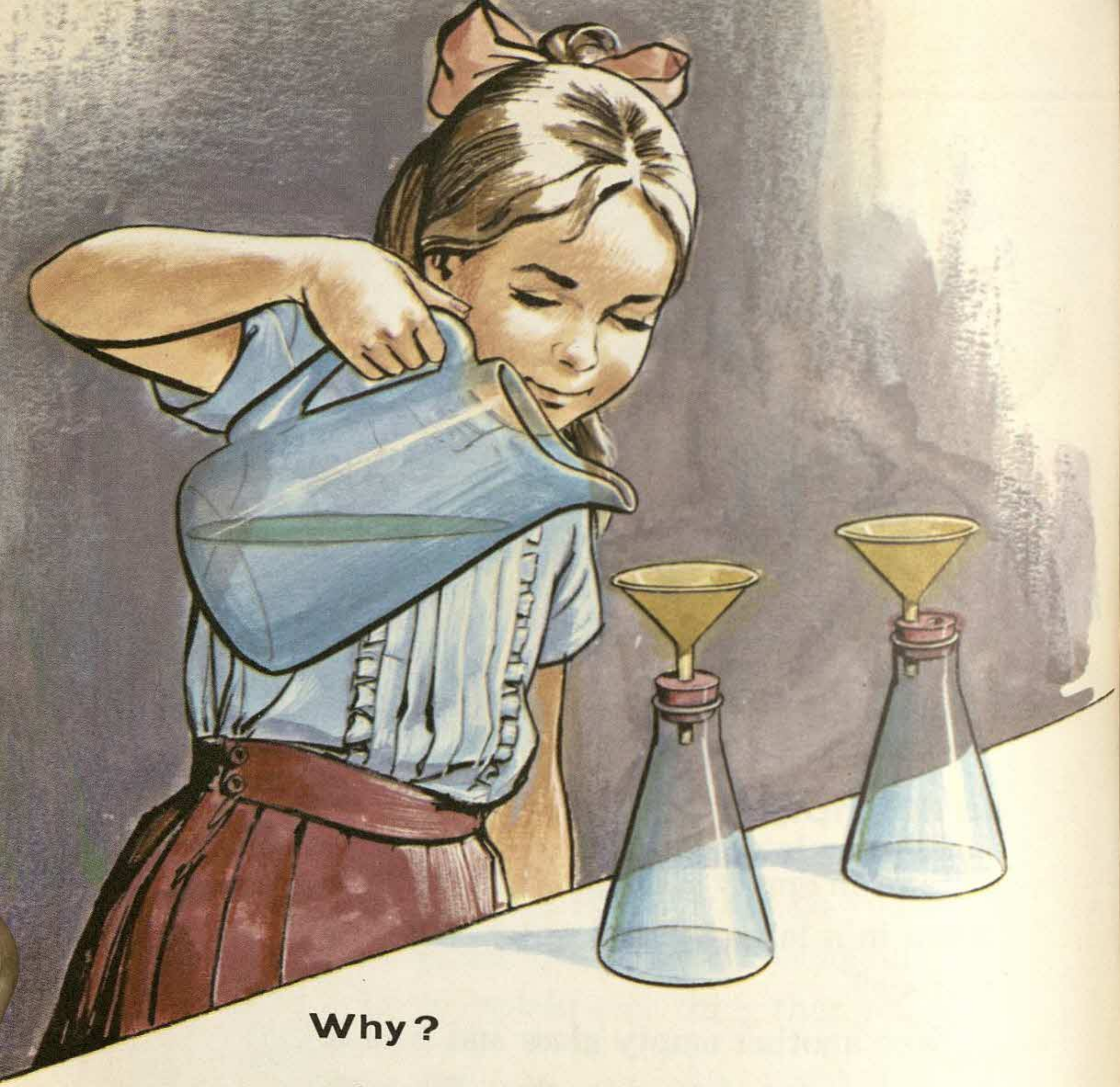
Now tilt the first glass slowly. Try to make the bubbles go inside the second glass.

What happens to this water? What happens to the bubbles?

Does the first glass stay empty?

What are bubbles really made of?

Was the first glass ever empty?



Why?

Carefully push a funnel through a one-hole stopper and place the stopper tightly in a bottle.

Now pour water slowly into the funnel.

What happens?

Try this again, only this time, put the funnel into a two-hole stopper.

What happens this time? Can you tell why?

What Happens?

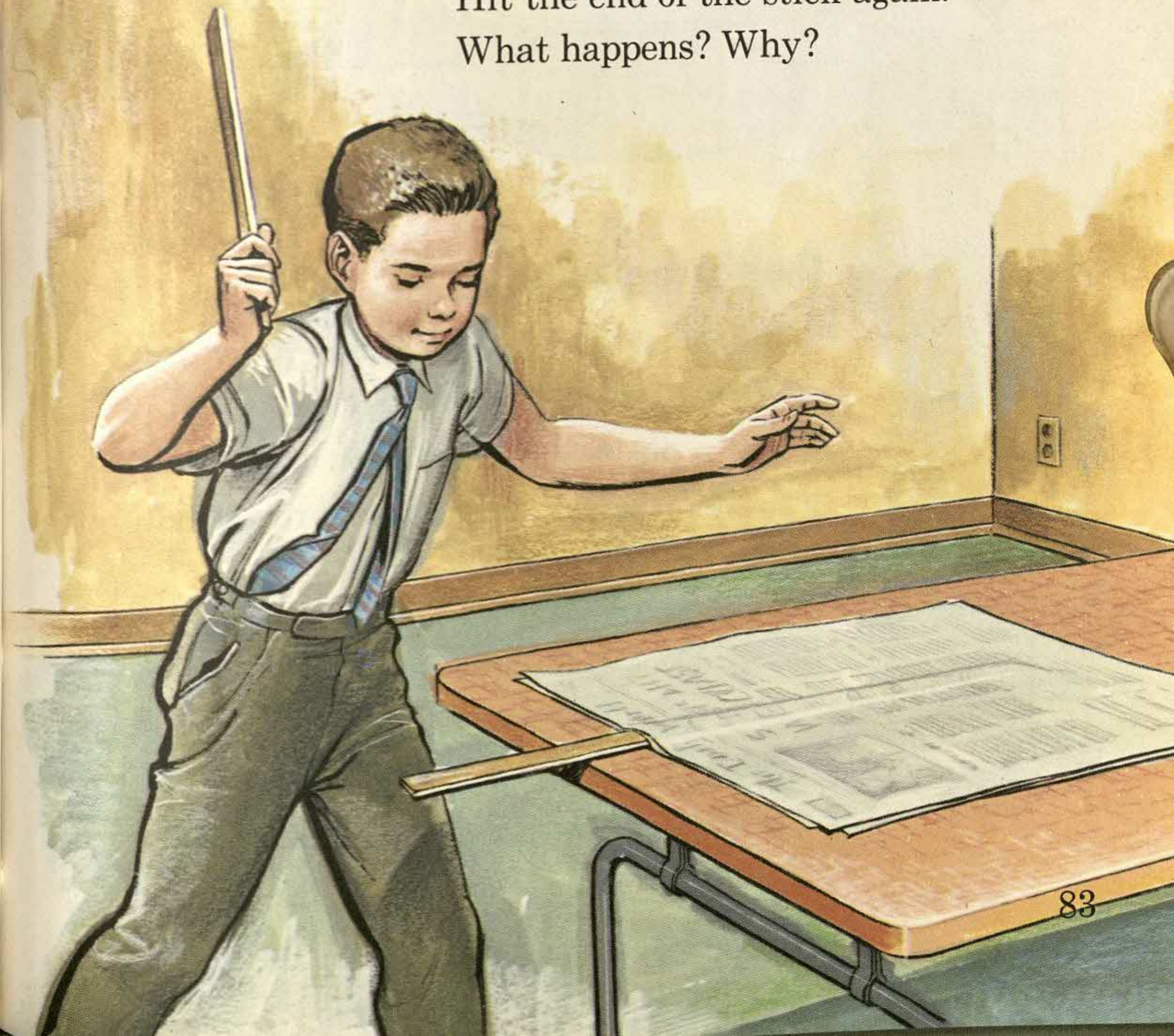
Place a thin stick on top of a table with 5 or 6 inches of it over the edge. Be careful! Do this activity away from your classmates. Make sure that no one is in front of the stick.

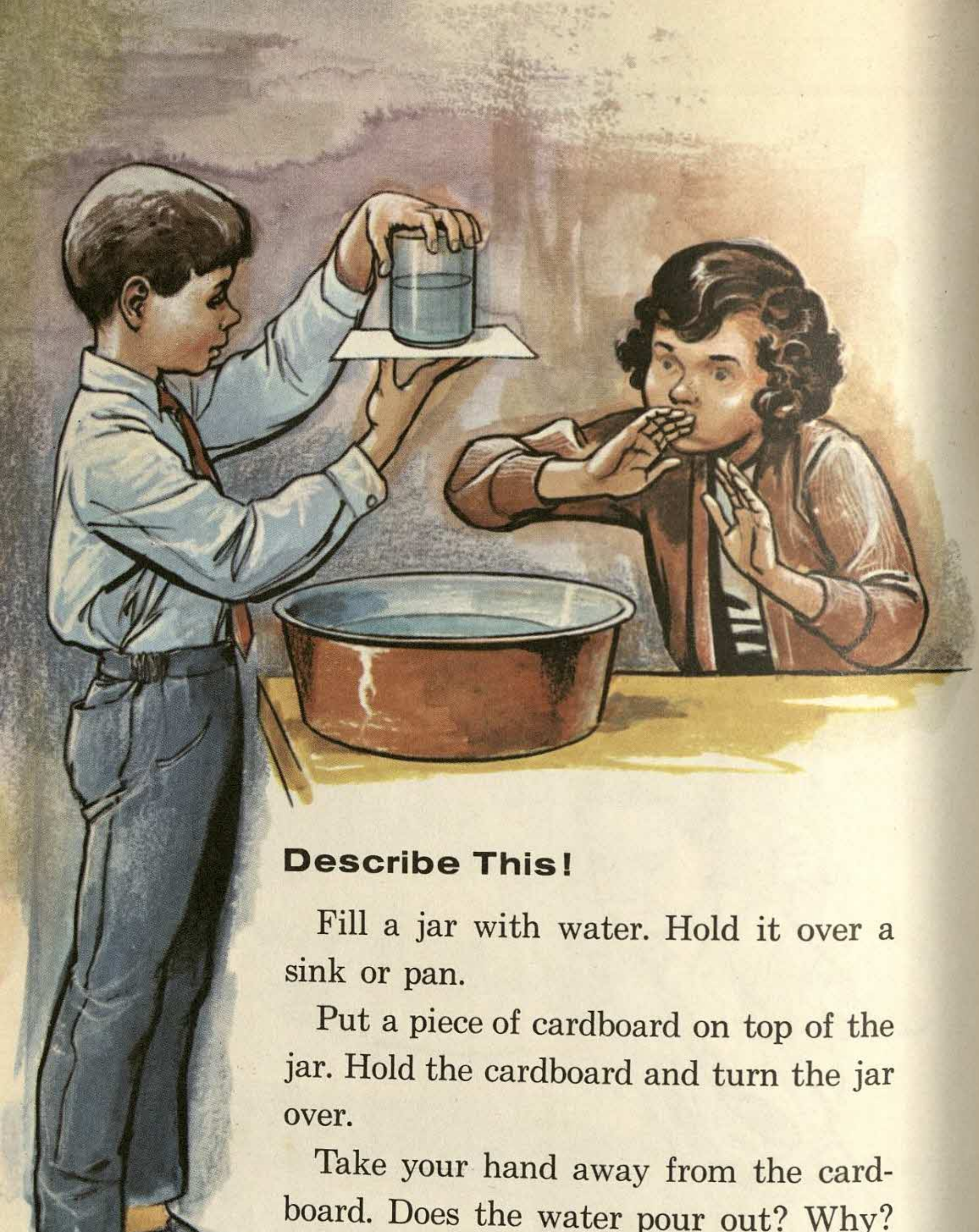
Hit the end of the stick. What happens?

Place the stick on the table again and cover it with 4 or 5 flat sheets of newspaper.

Hit the end of the stick again.

What happens? Why?





Describe This!

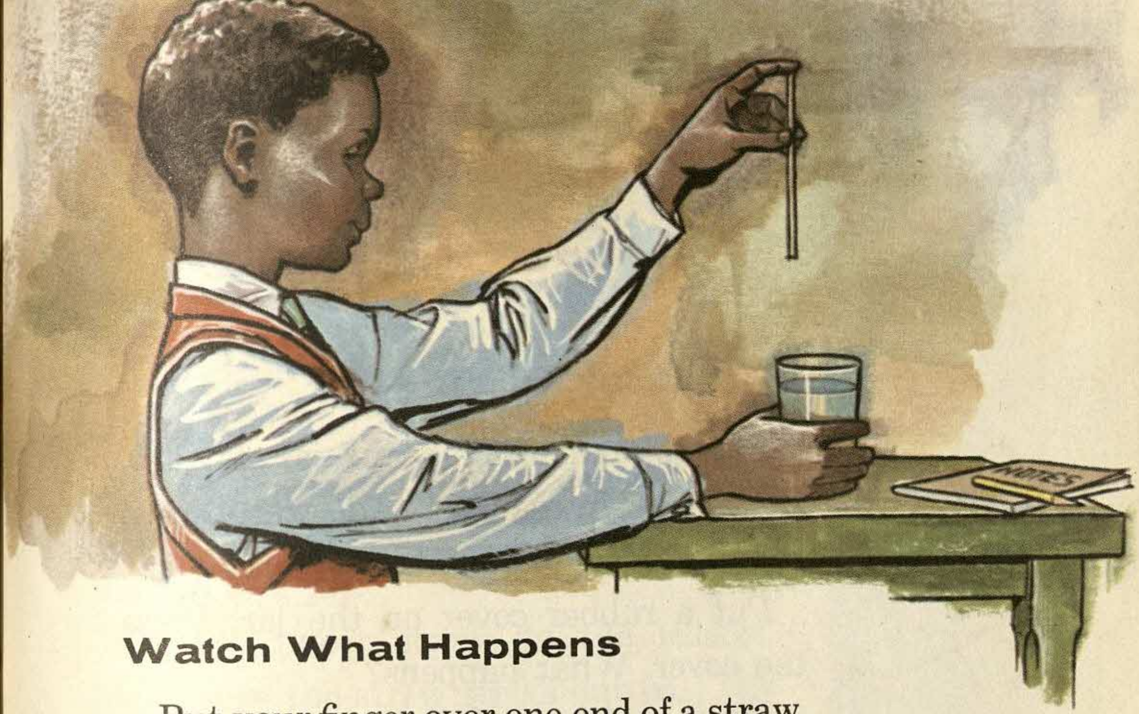
Fill a jar with water. Hold it over a sink or pan.

Put a piece of cardboard on top of the jar. Hold the cardboard and turn the jar over.

Take your hand away from the cardboard. Does the water pour out? Why?

Now tilt the jar sideways. Does the water pour out?

Can you explain what you have seen?



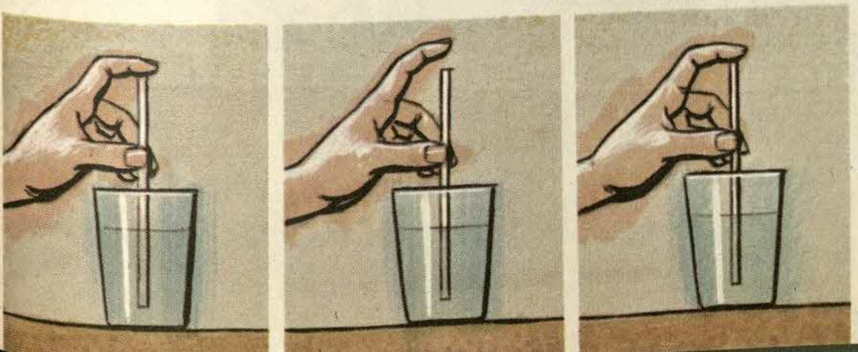
Watch What Happens

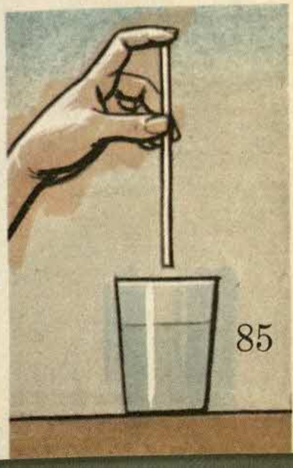
Put your finger over one end of a straw. Dip it straight down into a glass of water. In your notebook, draw a picture of what you see. Can you explain what you see?

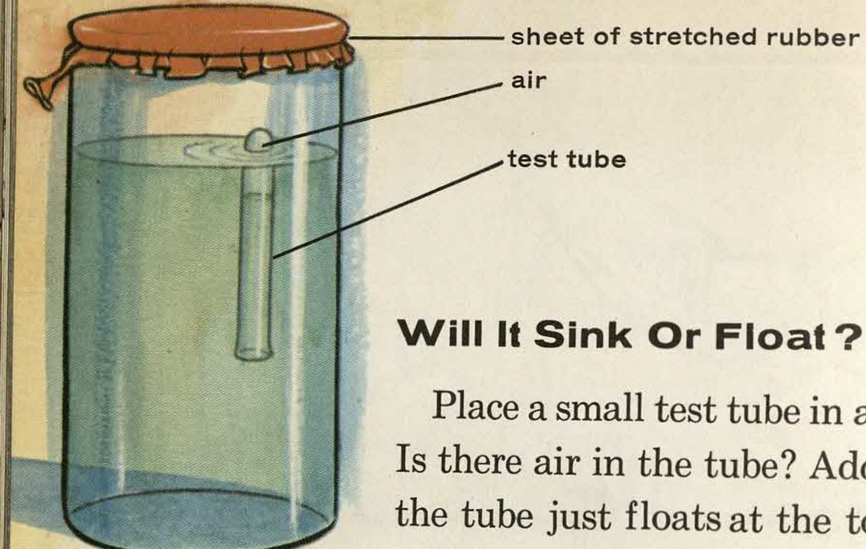
Take your finger away from the straw. Watch the water. How far does it enter?

Try putting the straw in deeply, then just a little. How far does the water enter each time?

Put your finger on the straw and lift it from the glass. Why does the water remain in the straw?







Will It Sink Or Float?

Place a small test tube in a jar of water. Is there air in the tube? Add water until the tube just floats at the top of the jar.

Put a rubber cover on the jar. Press the cover. What happens?

If you watch carefully, you will be able to explain why the test tube floats and sinks. Think.

The Air Around Us

The air around the earth is called the atmosphere (AT muhs feer). Does the atmosphere have weight?

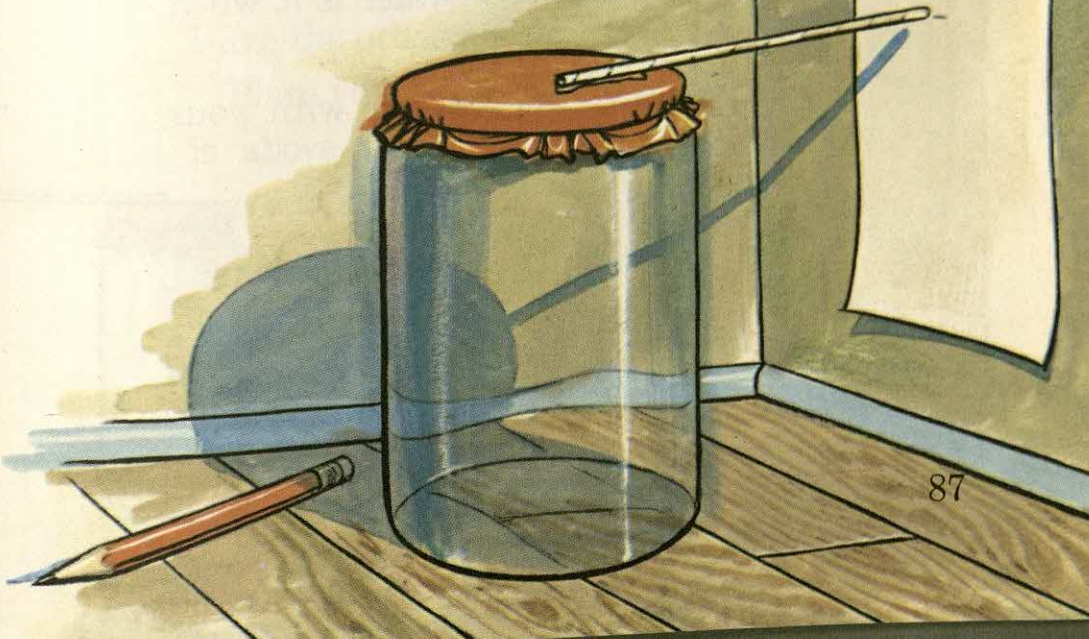
Cut a balloon and tie it tightly over the top of a jar.

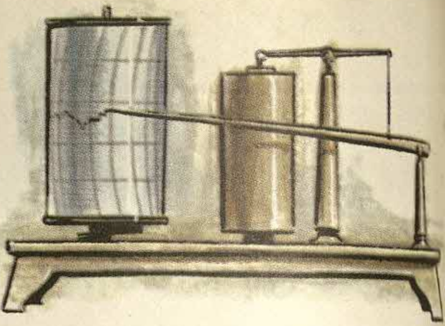
Glue a paper straw on the rubber. Make sure the straw sticks out past the edge of the jar.

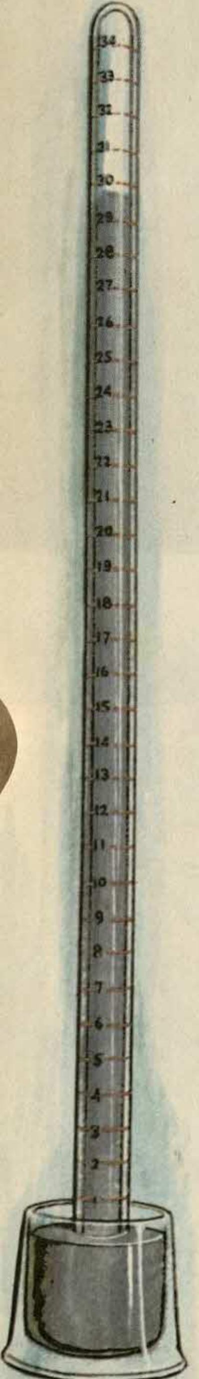
Mark a piece of paper where the straw touches the paper.

Each day measure the height of the tip of the straw. Keep a daily record.

Does your mark change? Compare your record with those of your classmates.







What Will The Weather Be?

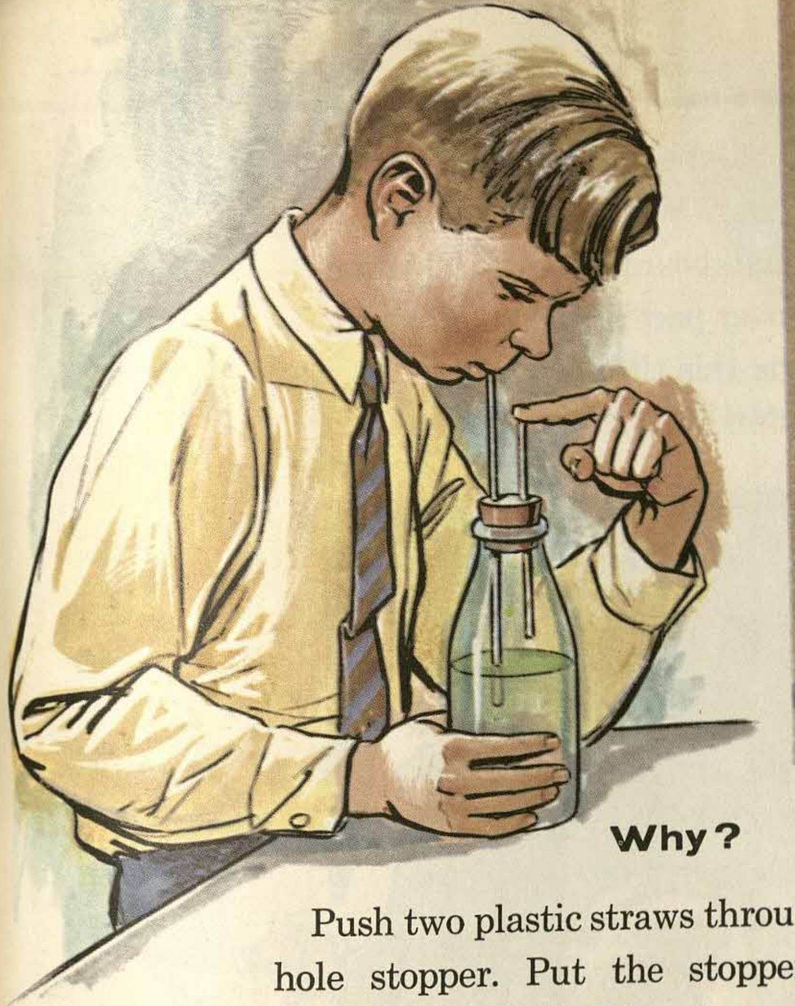
You have just made an instrument that measures air pressure. It is called a barometer (buh RAHM uh tur).

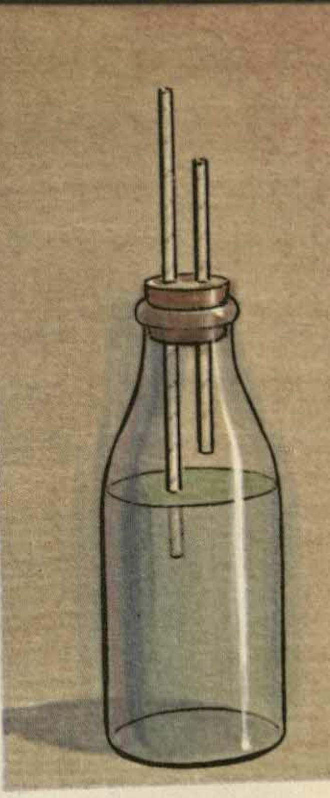
The weatherman uses a barometer to help him tell us what the weather will be.

The air pressure changes as the weather changes. When the weather is fair and sunny, the air pressure is high. When it is rainy, the air pressure is low.

What kind of weather is it when the tip of the straw on your barometer is high? What kind of weather is it when it is low?

Can you tell the weather with your barometer?





Why?

Push two plastic straws through a two-hole stopper. Put the stopper into a bottle half filled with water.

Push one straw into the water and leave the other just above the water.

Place your finger over the straw which is above the water. Try to drink the water from the other straw. What happens?

Take your finger off the straw and try again.

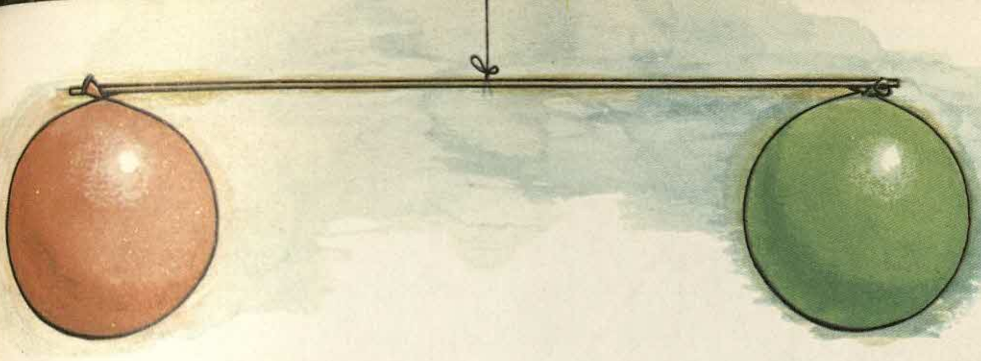
Do this a few times and try to explain what you observe.

Is There Water in Air?

Wet the chalkboard with a sponge. Watch the water. Where does it go?

Wet the chalkboard again. This time hold a glass over part of the chalkboard. What happens this time? Why?

Is there water in air?



What Do You Think?

How would you show a blind man that air is real?

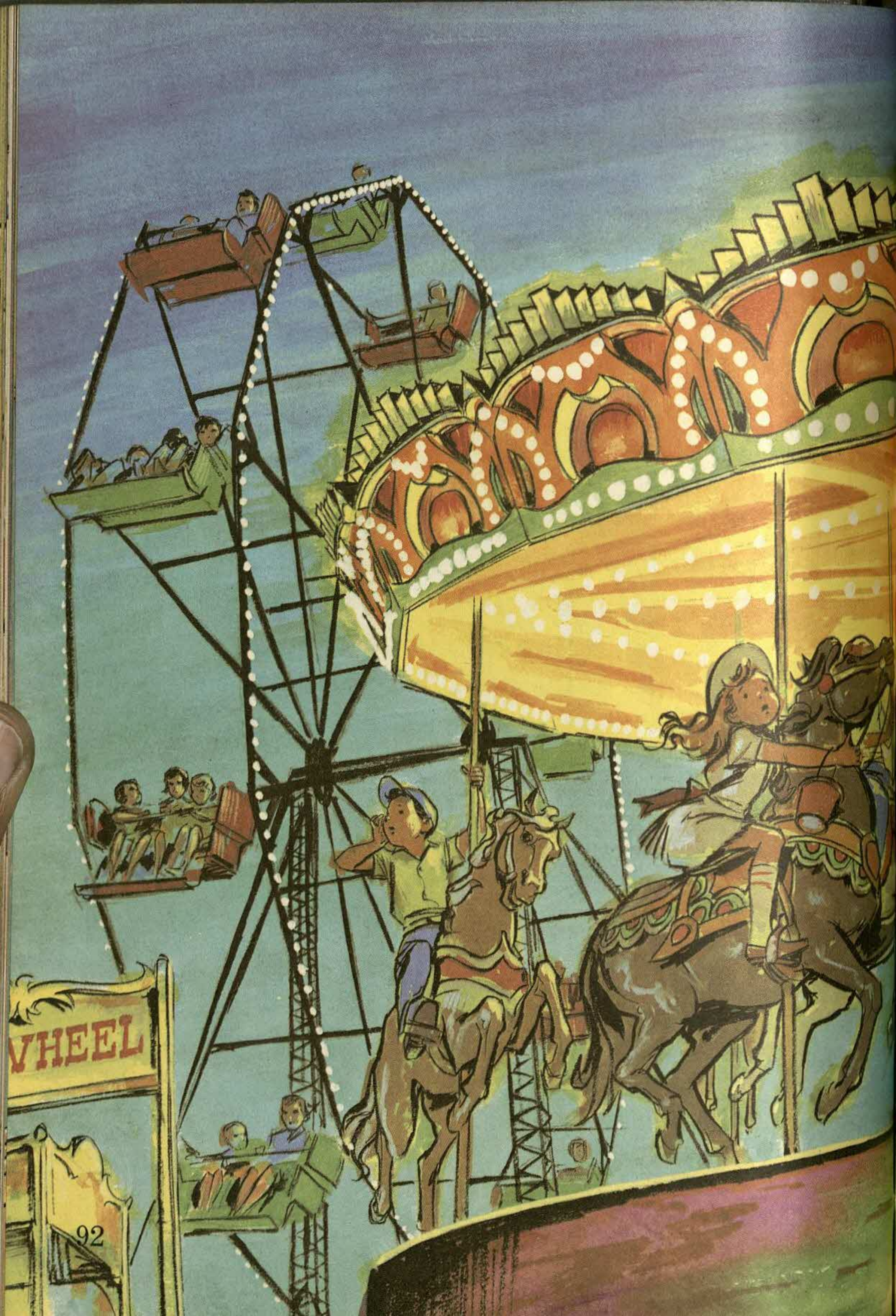
How could you show a friend that air has weight?

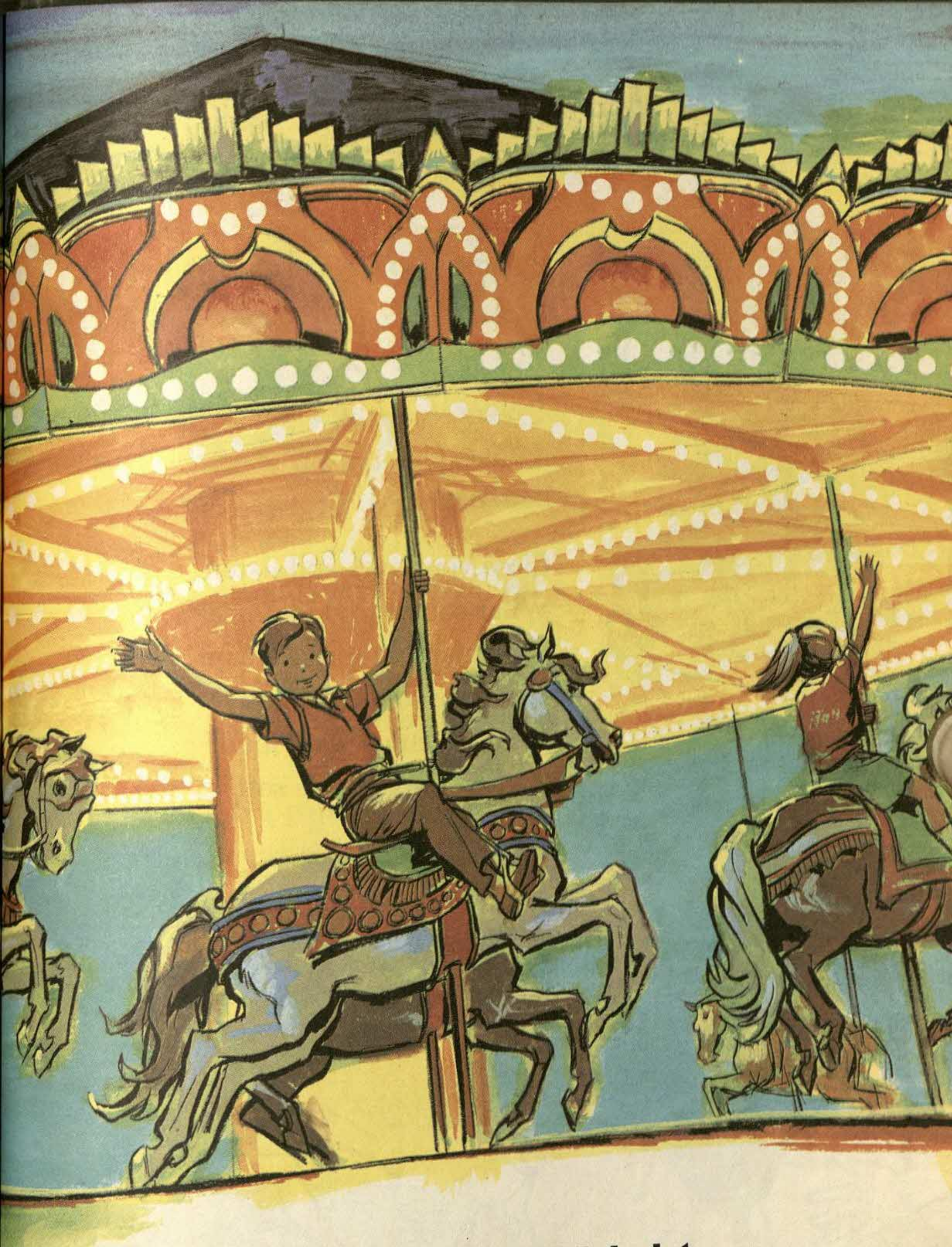
What is air pressure?

How are air and water alike?

How are they different?

Blow up a balloon. What can you do to make the balloon move by itself?

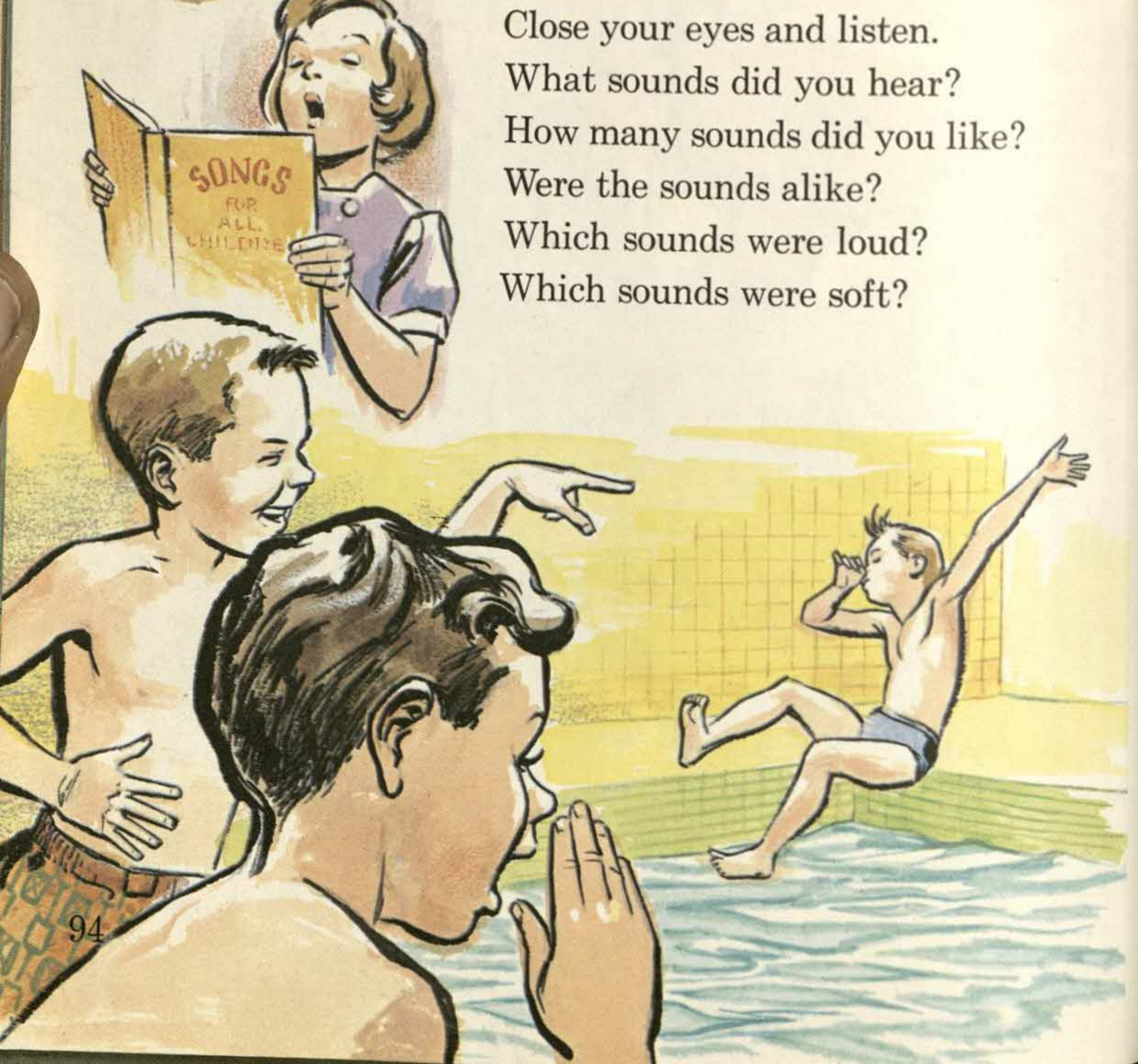

WHEEL



Sound and Light

Listen!

Close your eyes and listen.
What sounds did you hear?
How many sounds did you like?
Were the sounds alike?
Which sounds were loud?
Which sounds were soft?



What sounds do people make? What sounds do animals make? What sounds do you hear at night?

What sounds would you call noise? Try these.

Crush a piece of paper in your hand. Try some different kinds of paper.

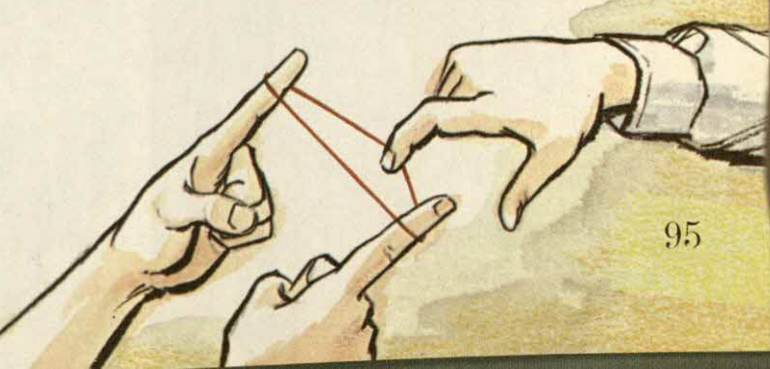
Blow up a paper bag. Break it.

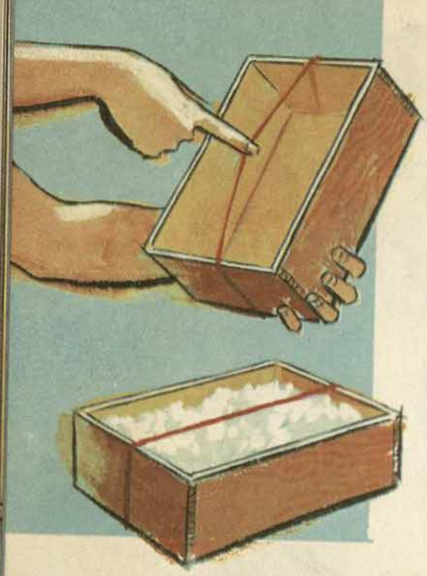
Blow across the top of an empty bottle.

Stretch a rubber band, and pluck it.

Tap the top of a round empty carton. Drop it.

Which sounds were pleasing?





Loud and Soft

Blow across the top of the empty bottle again. Listen. Blow harder. What happens?

Pull a rubber band around an empty box. Pluck the rubber band. Pluck it harder. Were the sounds alike? Fill the box with cotton or soft paper. Now pluck the band hard. What happens?

High and Low

Look carefully at the picture on top. Your box and rubber bands should look just like the picture.

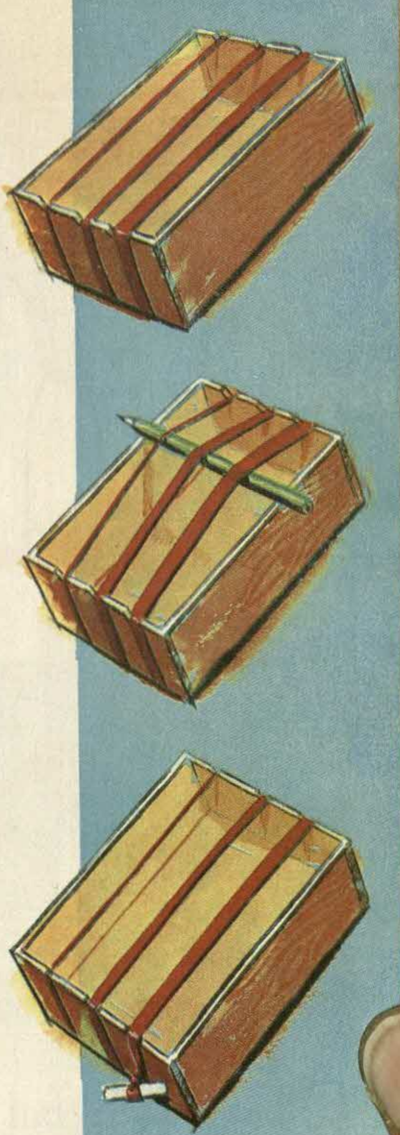
Pluck the first rubber band. Listen. Pluck the second band. Listen. Pluck the third one. Listen. Were the sounds alike?

Do it again and listen carefully.

Put a pencil under the rubber bands. Pluck the longer part of each. Listen. Are the sounds the same as before?

Pluck one band and listen. Twist a piece of chalk in the band to make it tighter. Pluck it again. What happens to the sound? Do it again.

Look at the bottom picture. How can such a few strings make so many sounds?

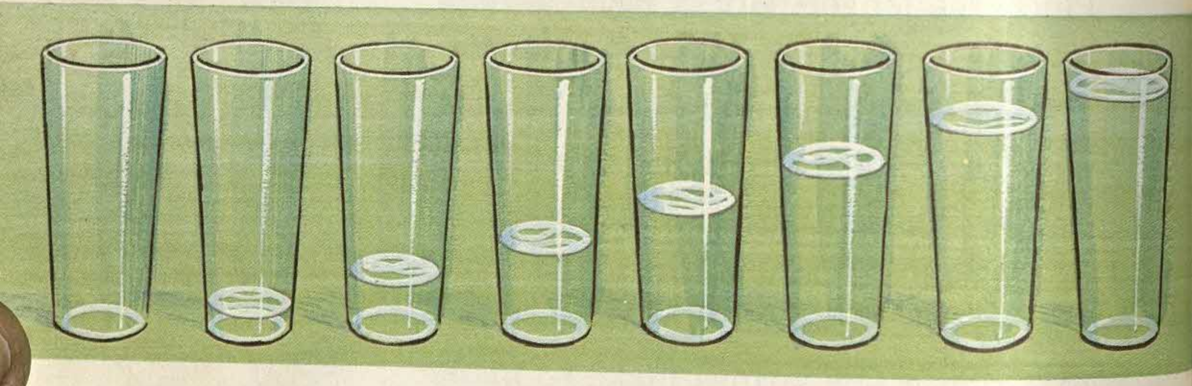


Blow and Tap

Blow across the top of an empty soda bottle. Listen to the sound. Pour a little water in the bottle. Blow again. Add a little more water. Blow again.

What happens to the sounds as you add water?

As you add water, what is pushed out of the bottle?



Take eight tall drinking glasses. Pour water into seven of the glasses so they will look like the glasses in the picture. Leave one glass empty.

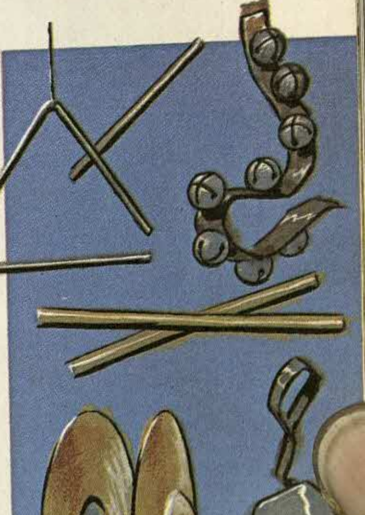
Tap the glasses with a pencil. Listen. Try to play a tune on the glasses.

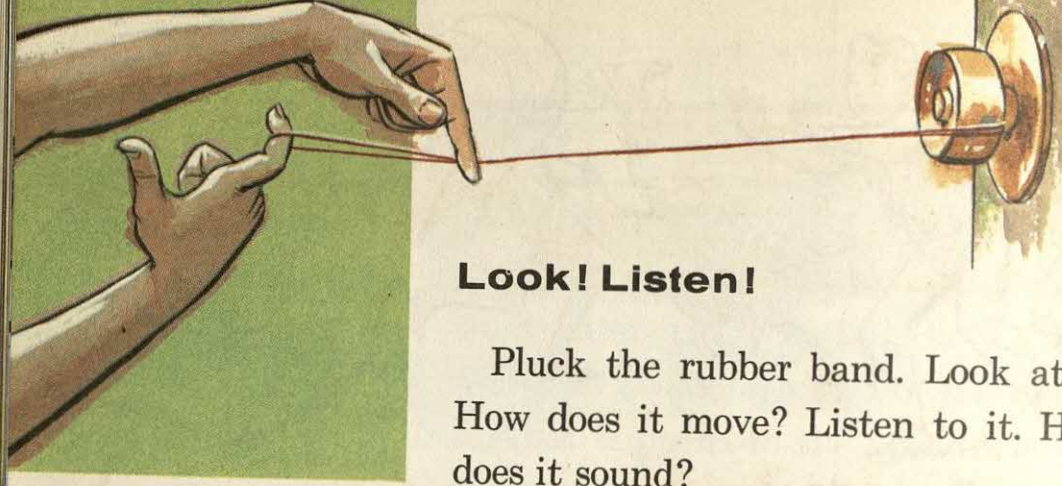
Many Sounds

There are loud sounds and soft sounds. There are high sounds and low sounds. There are sounds we like to hear, and sounds we do not like to hear. The sounds we do not like to hear are called noises.

Why do people like to listen to music?

What is the difference between music and noise?





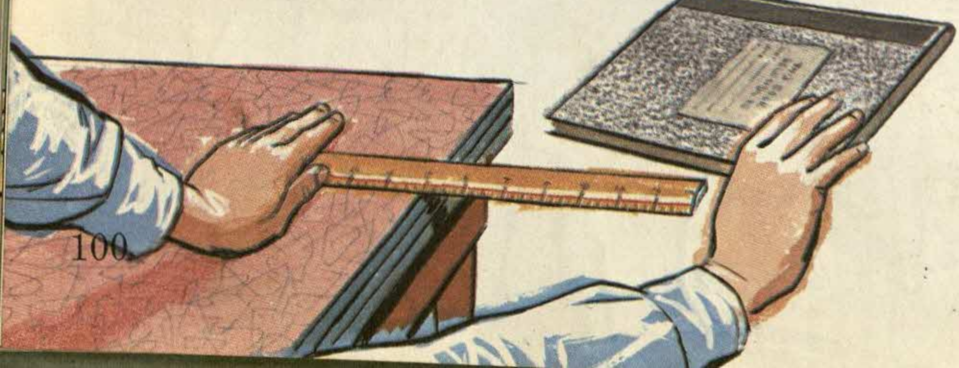
Look! Listen!

Pluck the rubber band. Look at it. How does it move? Listen to it. How does it sound?

Wet your finger and rub it around the top of the glass. Look at the top of the water. What happens?

Tap the drum. Listen. Look at the sand. What happens?

Tap the ruler. Look. Listen.

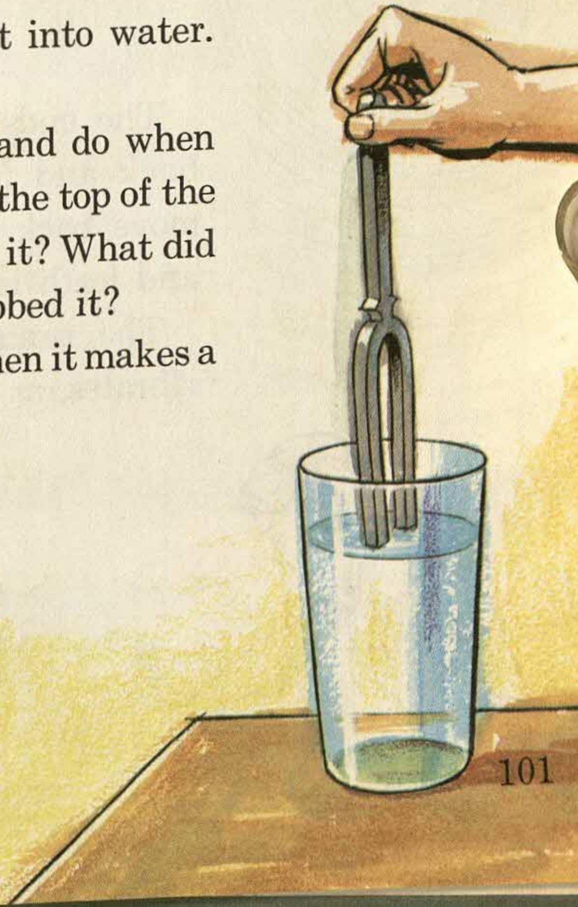


This is a tuning fork. Tap it against your rubber heel. Listen. Tap the fork again and hold it close to your ear. Tap it again and hold it close to your nose. What happens?

Tap the fork and put it into water. What happens? Why?

What did the rubber band do when you plucked it? What did the top of the drum do when you tapped it? What did the glass do when you rubbed it?

What does a thing do when it makes a sound?



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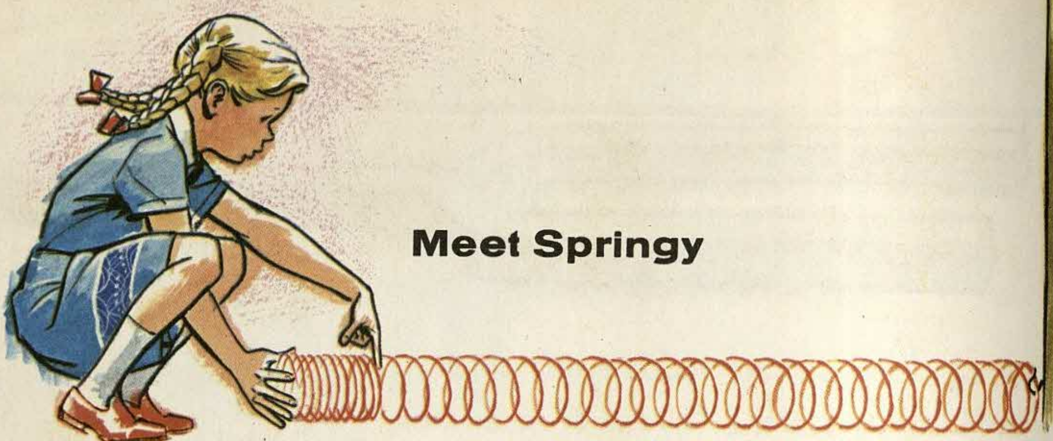
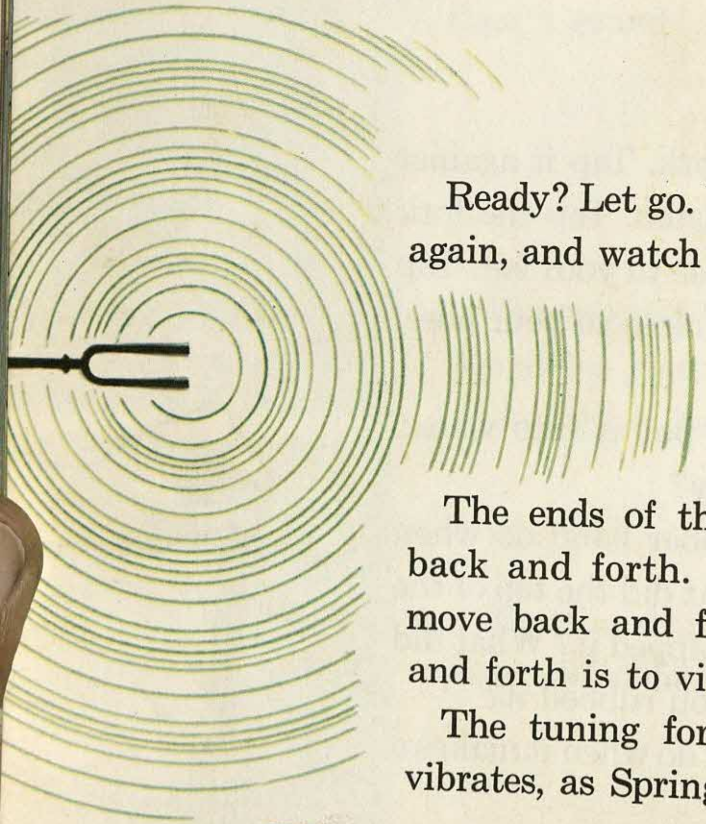


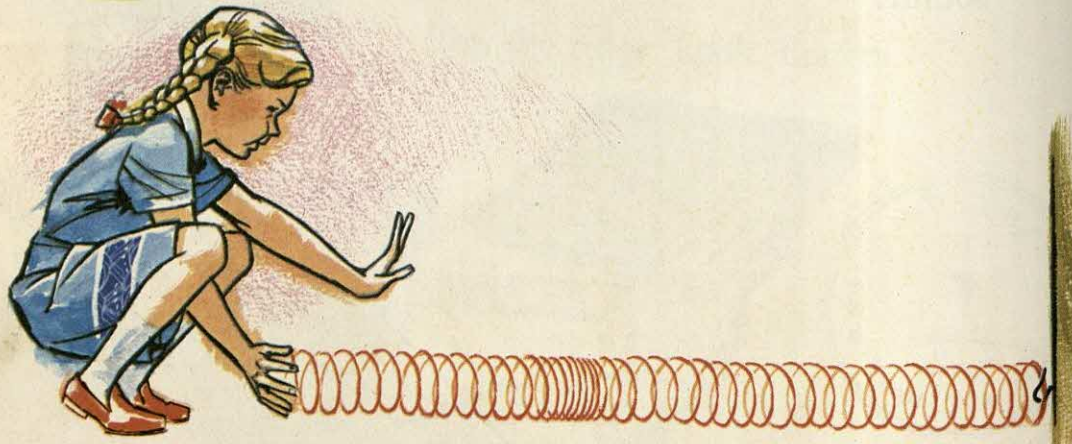
Meet Springy

Ready? Let go. What happens? Do it again, and watch carefully.



The ends of the tuning fork move back and forth. They make the air move back and forth. To move back and forth is to vibrate (VY brate).

The tuning fork vibrates. The air vibrates, as Springy did.



Remember!

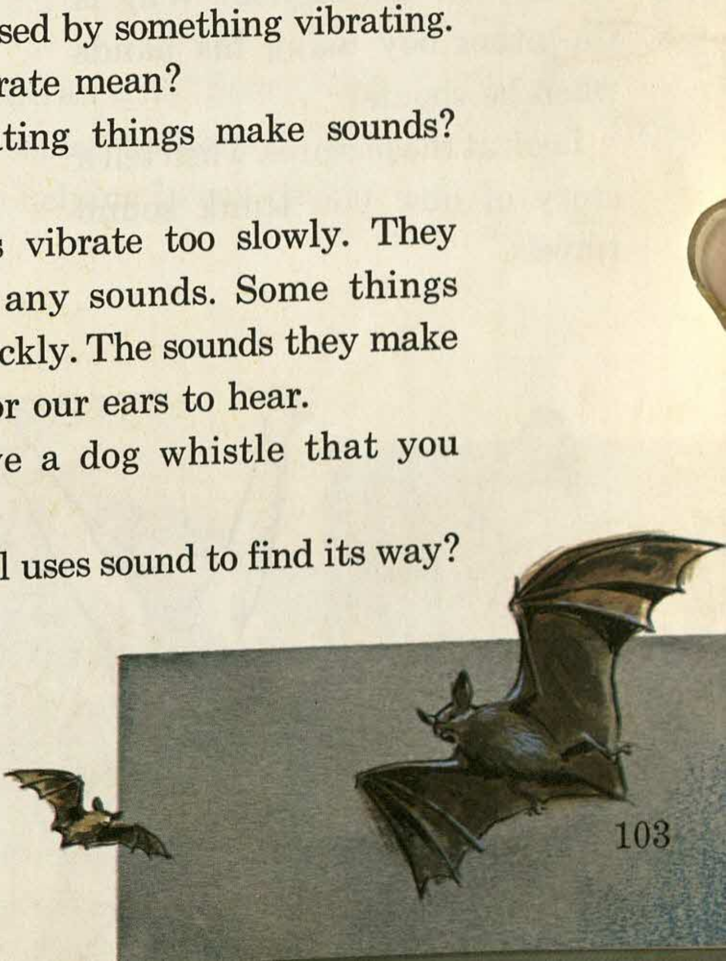
Sound is caused by something vibrating. What does vibrate mean?

Do all vibrating things make sounds? Think.

Some things vibrate too slowly. They do not make any sounds. Some things vibrate too quickly. The sounds they make are too high for our ears to hear.

Do you have a dog whistle that you cannot hear?

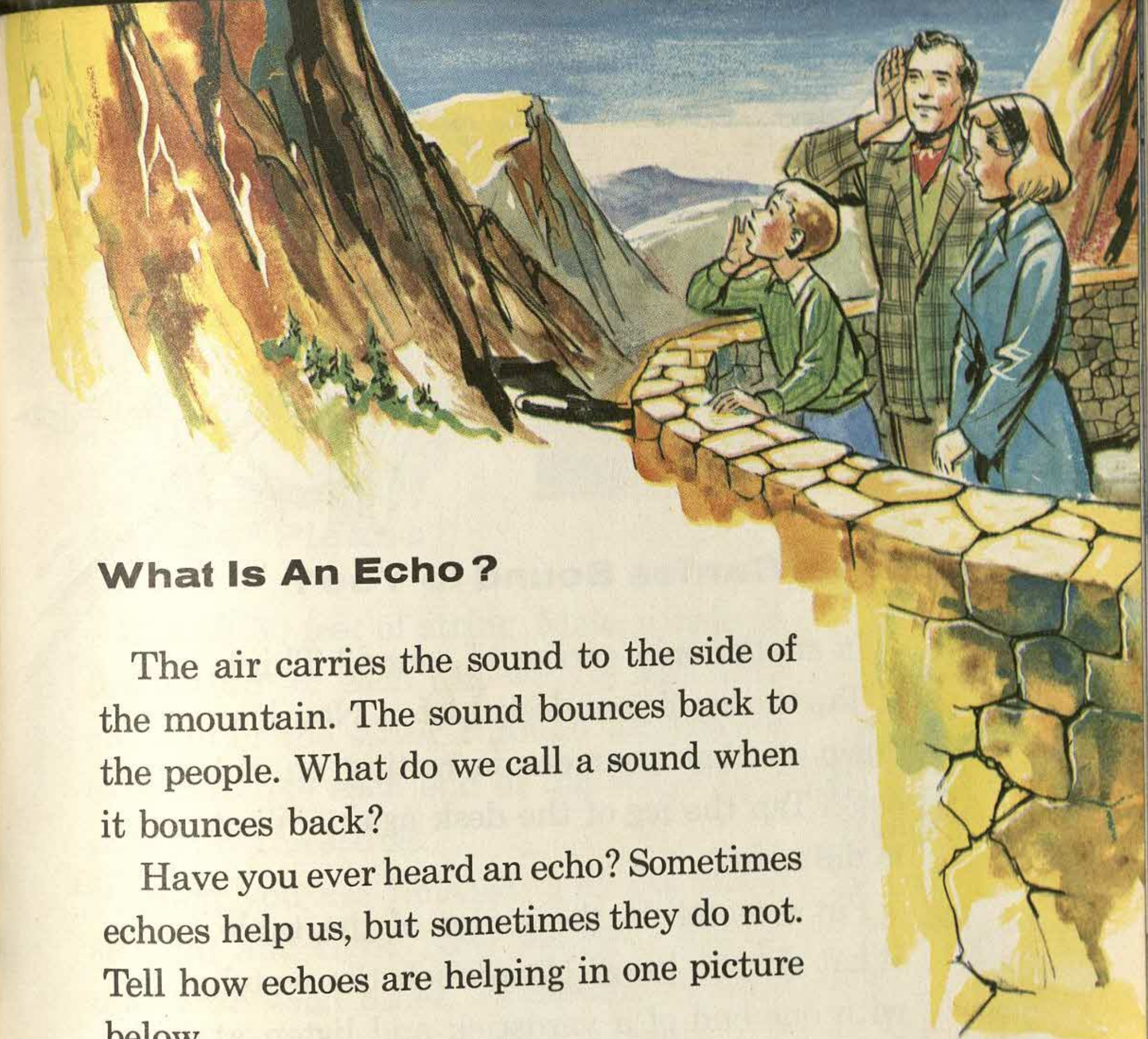
What animal uses sound to find its way?



How Do Sounds Come to You?

What is carrying the sound to the boy on the bicycle? Why is the other boy using his hands when he shouts?

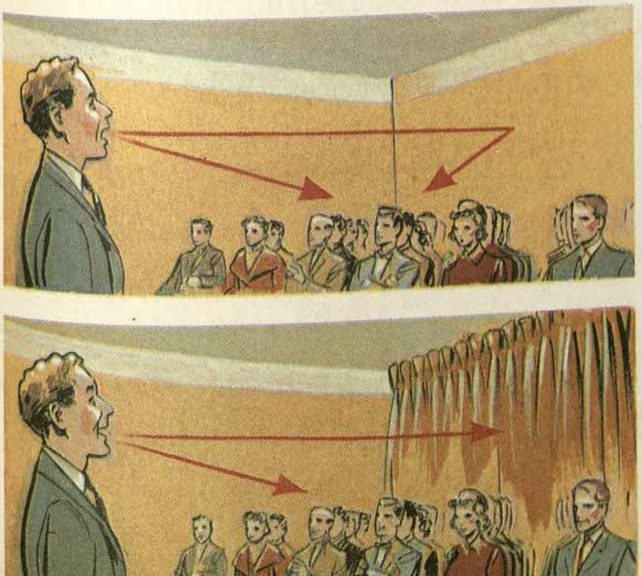
Look at the pictures. Then tell a story of how you think sound travels.

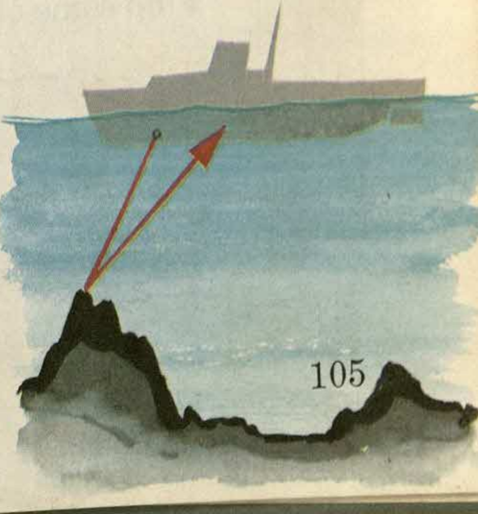


What Is An Echo?

The air carries the sound to the side of the mountain. The sound bounces back to the people. What do we call a sound when it bounces back?

Have you ever heard an echo? Sometimes echoes help us, but sometimes they do not. Tell how echoes are helping in one picture below.





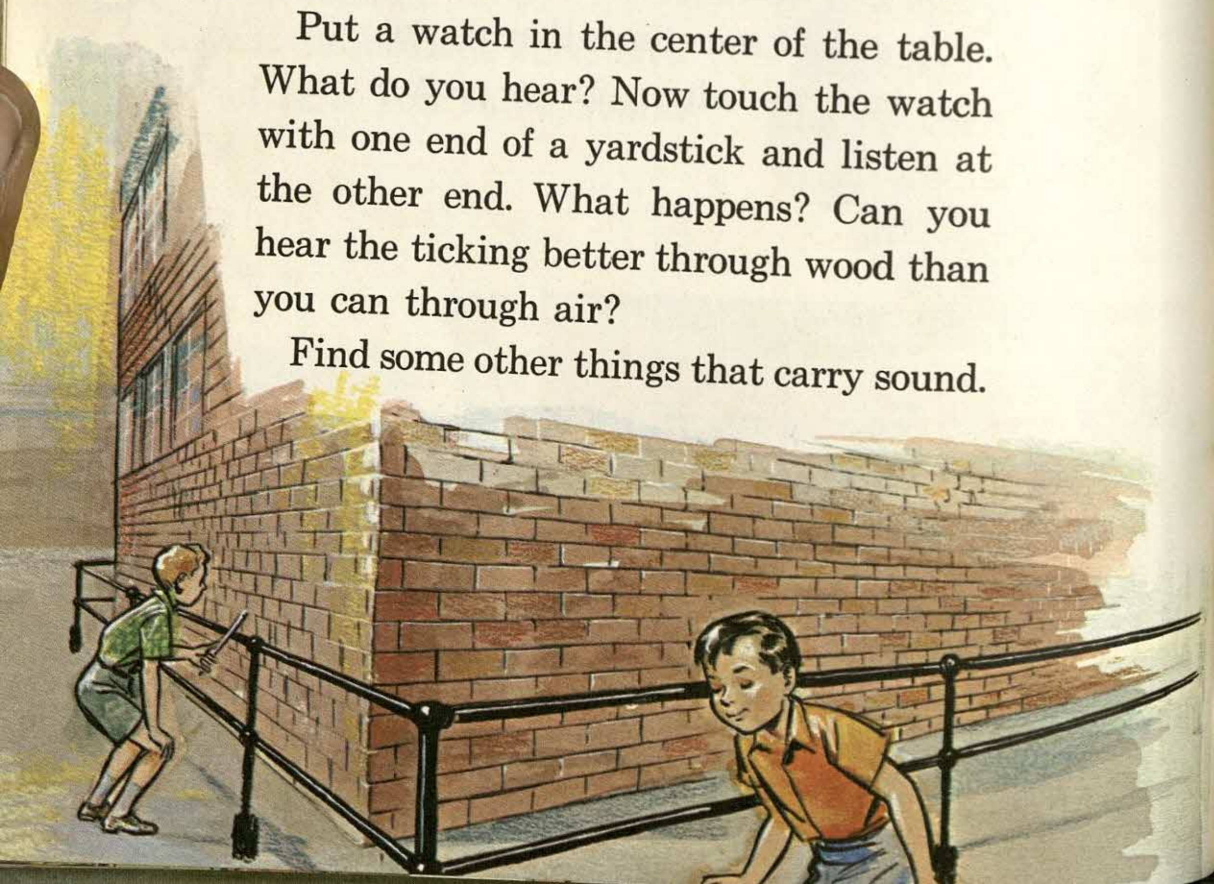
What Carries Sound to You?

Is air the only carrier of sound? Think.

Tap the leg of your desk. Listen. Now lean down so that your ear is resting on the desk. Tap the leg of the desk again. What is different?

Put a watch in the center of the table. What do you hear? Now touch the watch with one end of a yardstick and listen at the other end. What happens? Can you hear the ticking better through wood than you can through air?

Find some other things that carry sound.

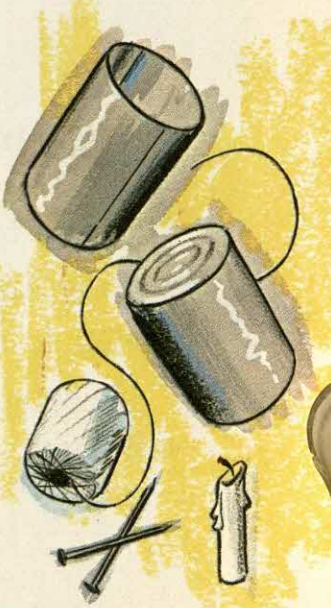


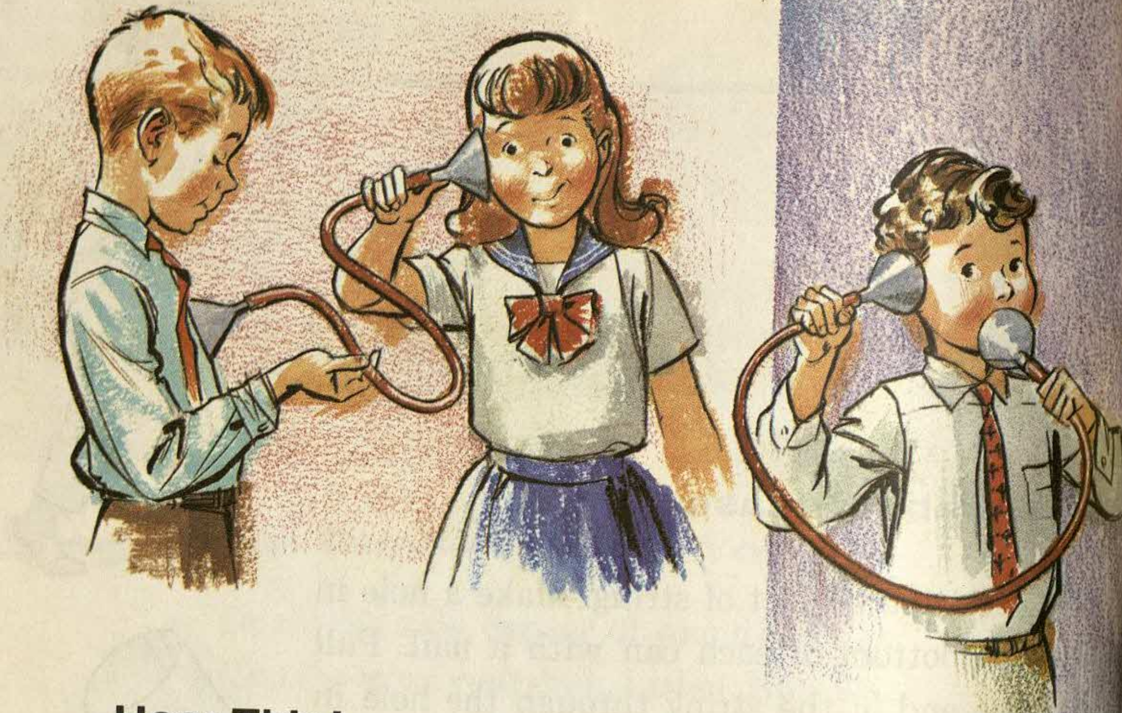
Number Please

Cut off 30 feet of string. Make a hole in the bottom of each can with a nail. Pull one end of the string through the hole in each can. Tie each end of the string to a nail. Wax the string.

When you are finished, pull the string straight and tight. Now you are ready to talk with each other. Remember to keep the string very tight while you talk.

Try it with wire instead of string. Can you hear better?

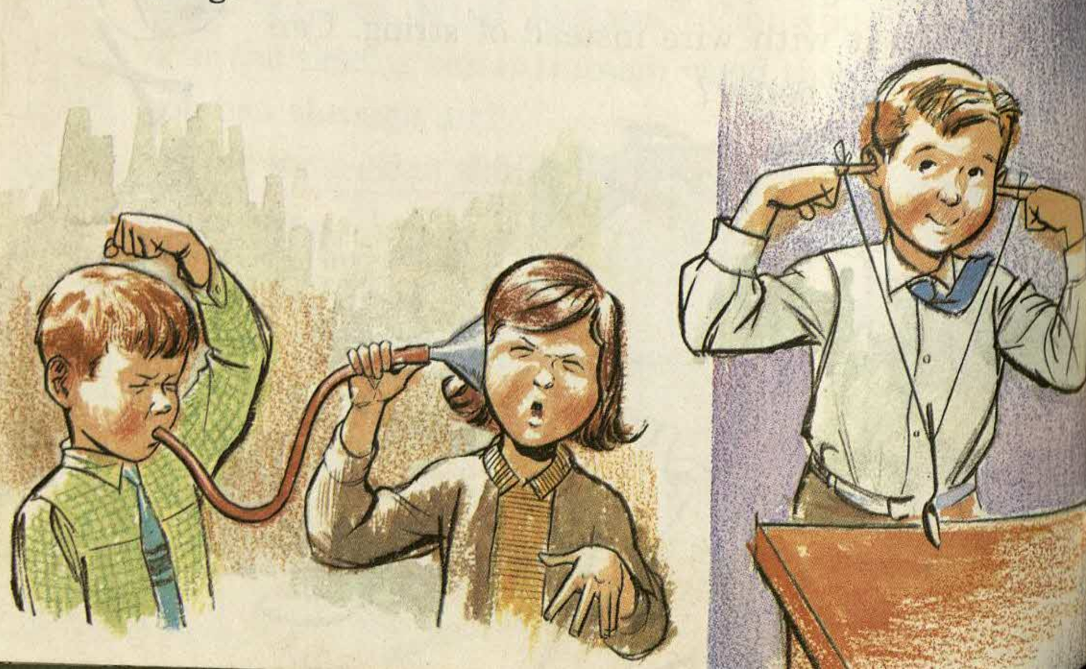


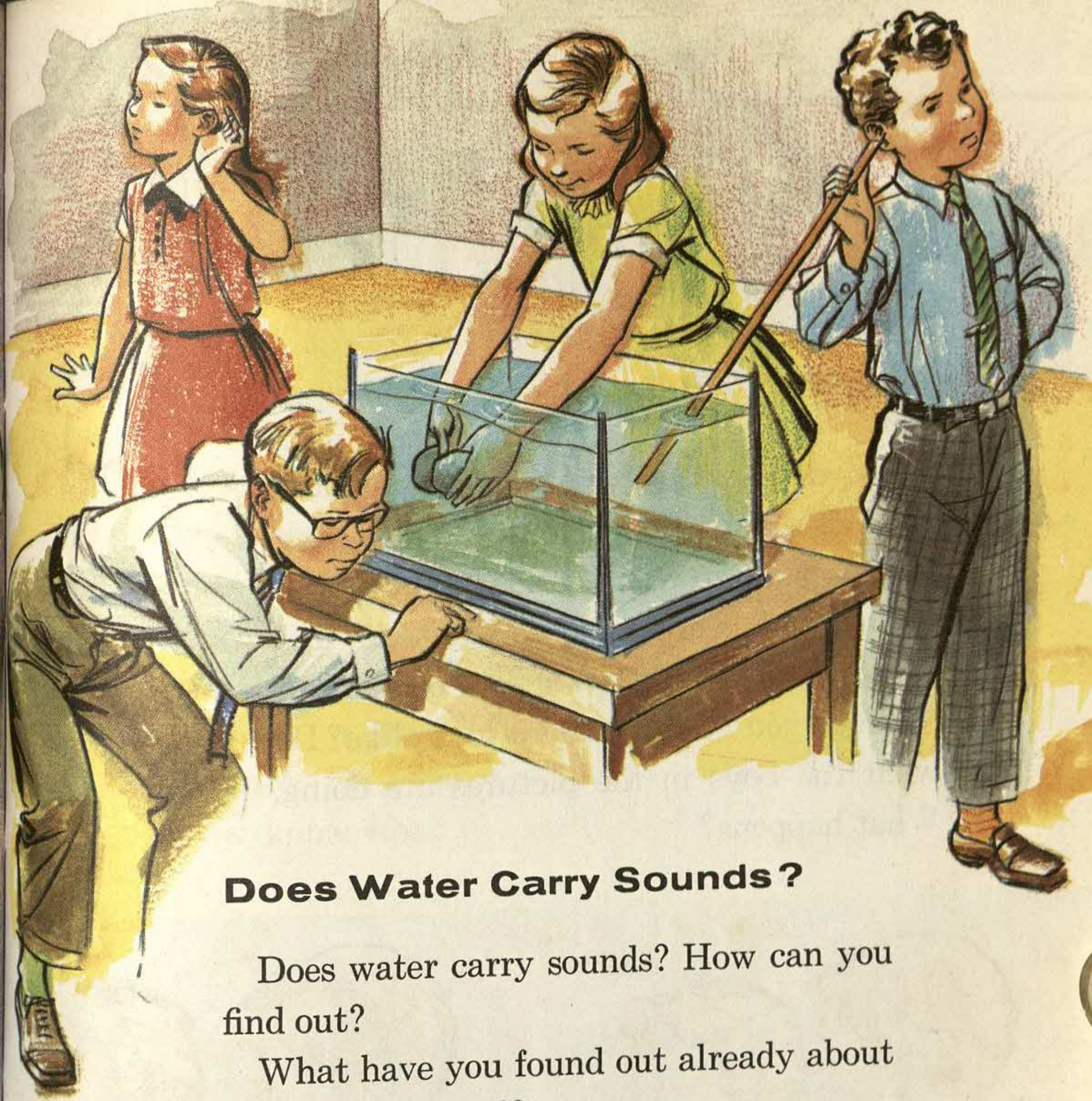


Hear This!

Listen to a heartbeat. Listen to yourself talking. Listen to your friend tap his head. Listen to a spoon as it strikes your desk.

Do what the children in the pictures are doing.





Does Water Carry Sounds?

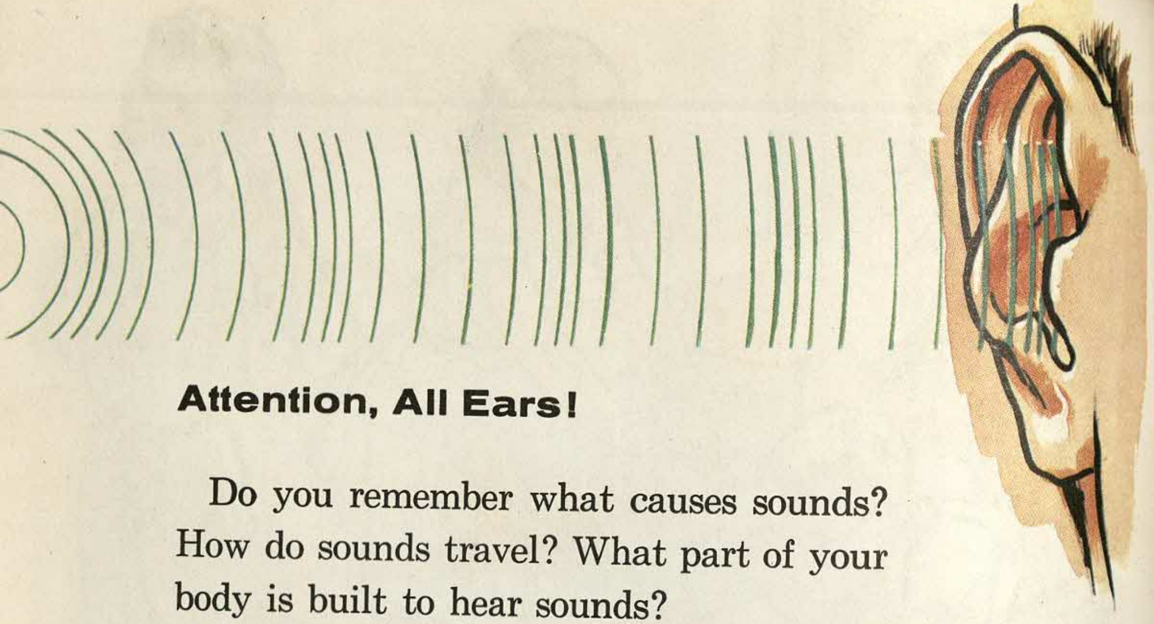
Does water carry sounds? How can you find out?

What have you found out already about how sounds travel?

All sounds need a carrier. Air carries sound. So do wood, metals, and water.

Remember? Sound is caused by something vibrating. Solids, liquids, and gases can vibrate.

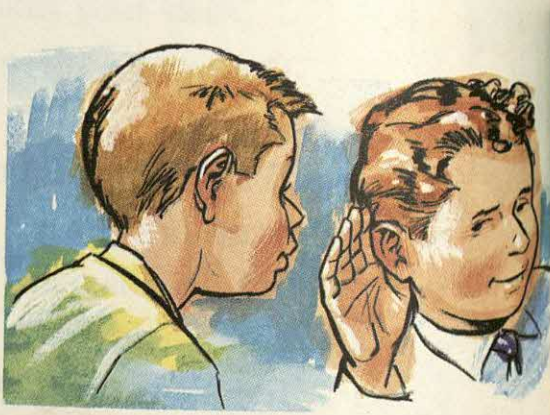
There is no air around the moon. What difference would that make?

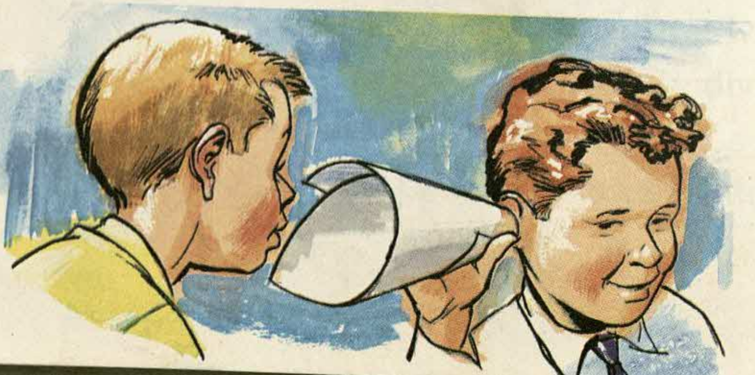


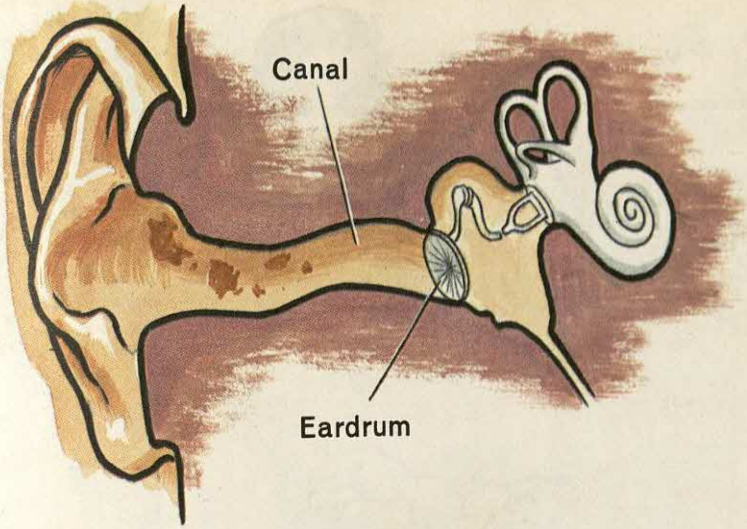
Attention, All Ears!

Do you remember what causes sounds? How do sounds travel? What part of your body is built to hear sounds?

Have you ever looked at your ears in a mirror? Look at the ears of your classmates. What do you see? Do all ears look alike? Do what the boys in the pictures are doing. What happens?



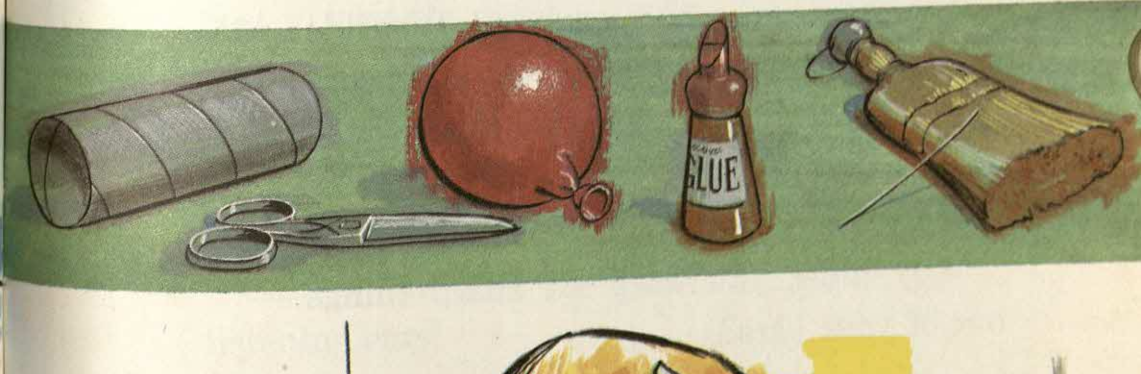


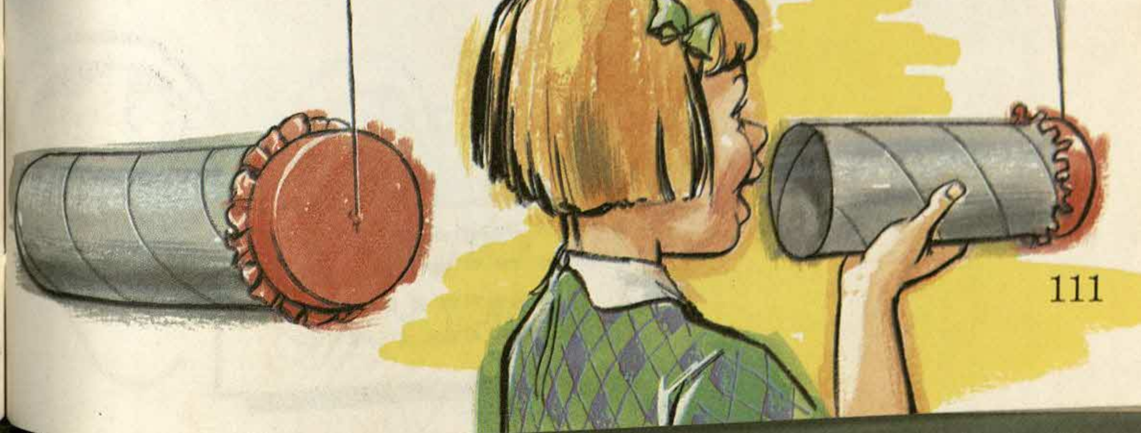


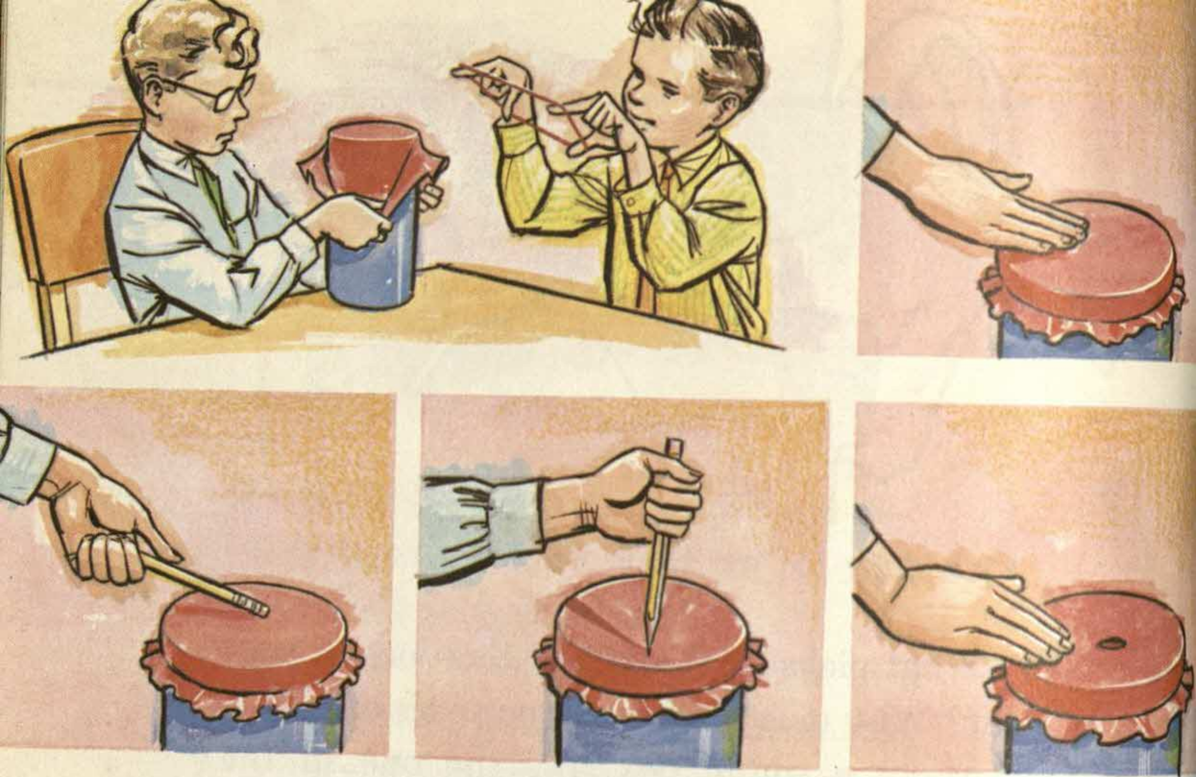
The Ear

What picks up the sound vibrations in your ear? Why must you keep your ears clean?

Make a sound box like the one in the picture. Do what the girl is doing. Do you now know what the eardrum does?







Take Care

Tap the drum with your hand. What do you hear? Tap harder. What do you hear?

Hit the top of the drum with a pencil. Push the pencil through the top. Tap the drum again. What do you hear?

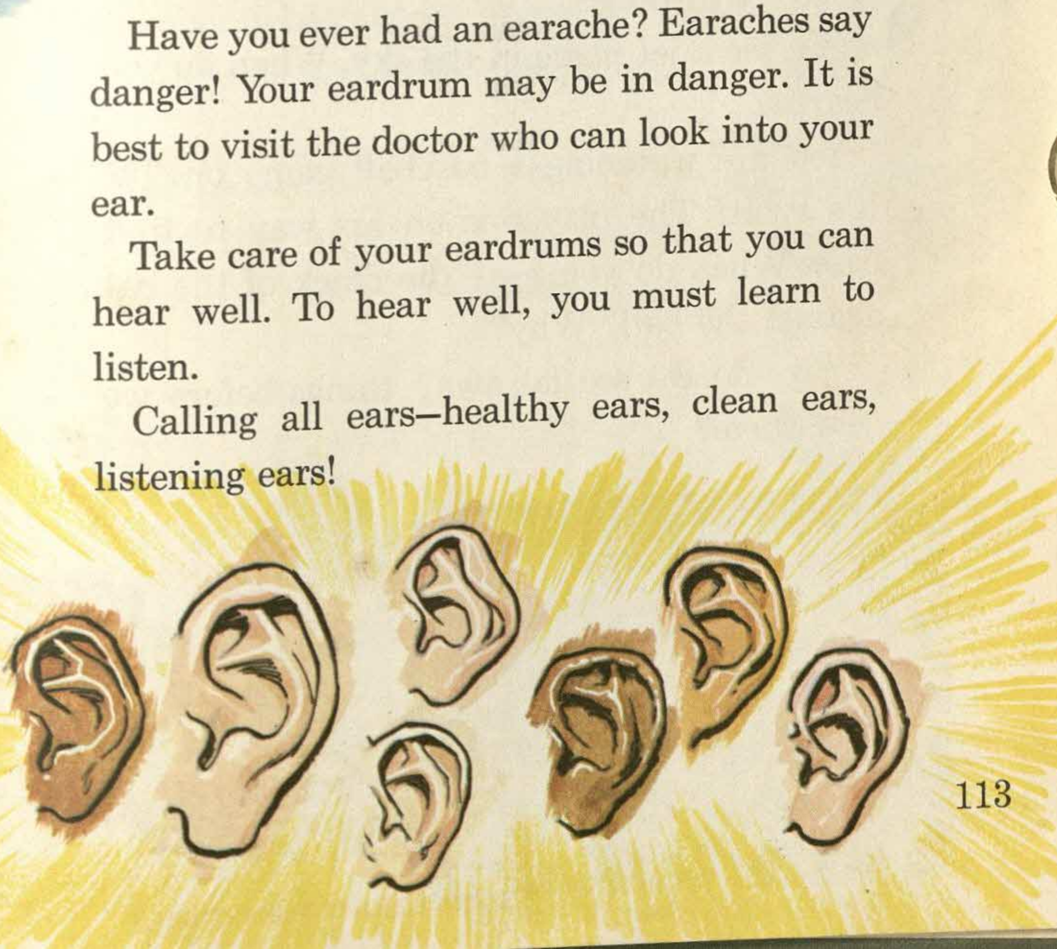
Why must you keep all sharp things out of your ears?

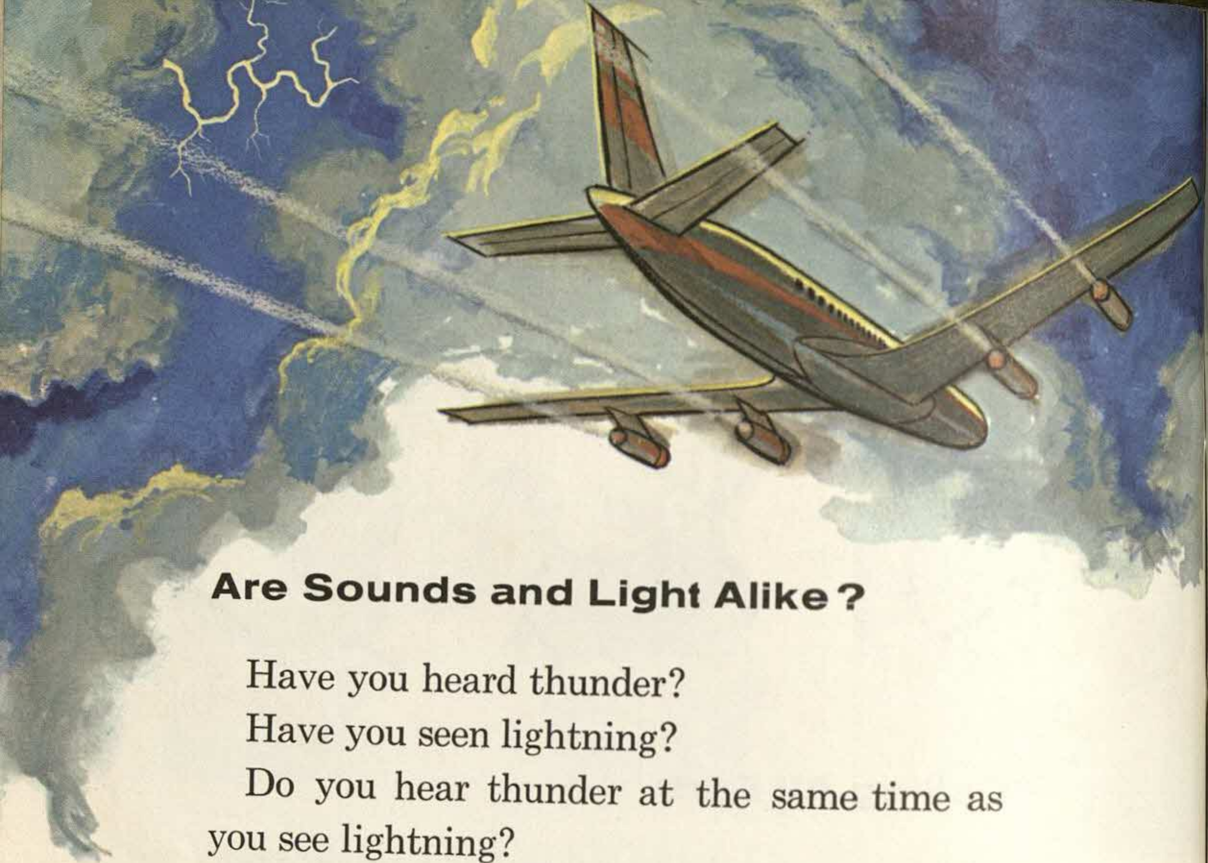
Calling All Ears

Have you ever had an earache? Earaches say danger! Your eardrum may be in danger. It is best to visit the doctor who can look into your ear.

Take care of your eardrums so that you can hear well. To hear well, you must learn to listen.

Calling all ears—healthy ears, clean ears, listening ears!





Are Sounds and Light Alike?

Have you heard thunder?

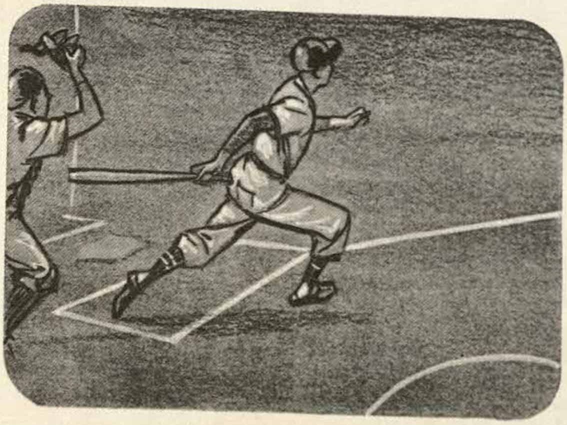
Have you seen lightning?

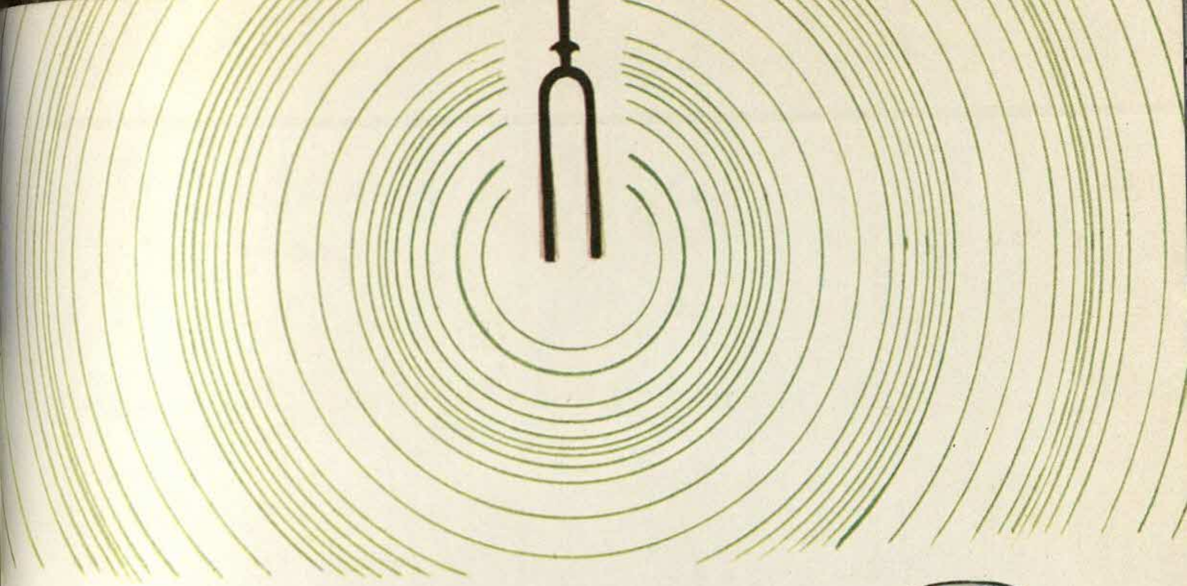
Do you hear thunder at the same time as you see lightning?

You see a jet plane in the sky. When do you hear it?

You are watching a baseball game on TV. It's a hit! The player is on his way to first base. When do you hear the crack of the bat against the ball? Why?

Why do we see far-away things before we hear them?





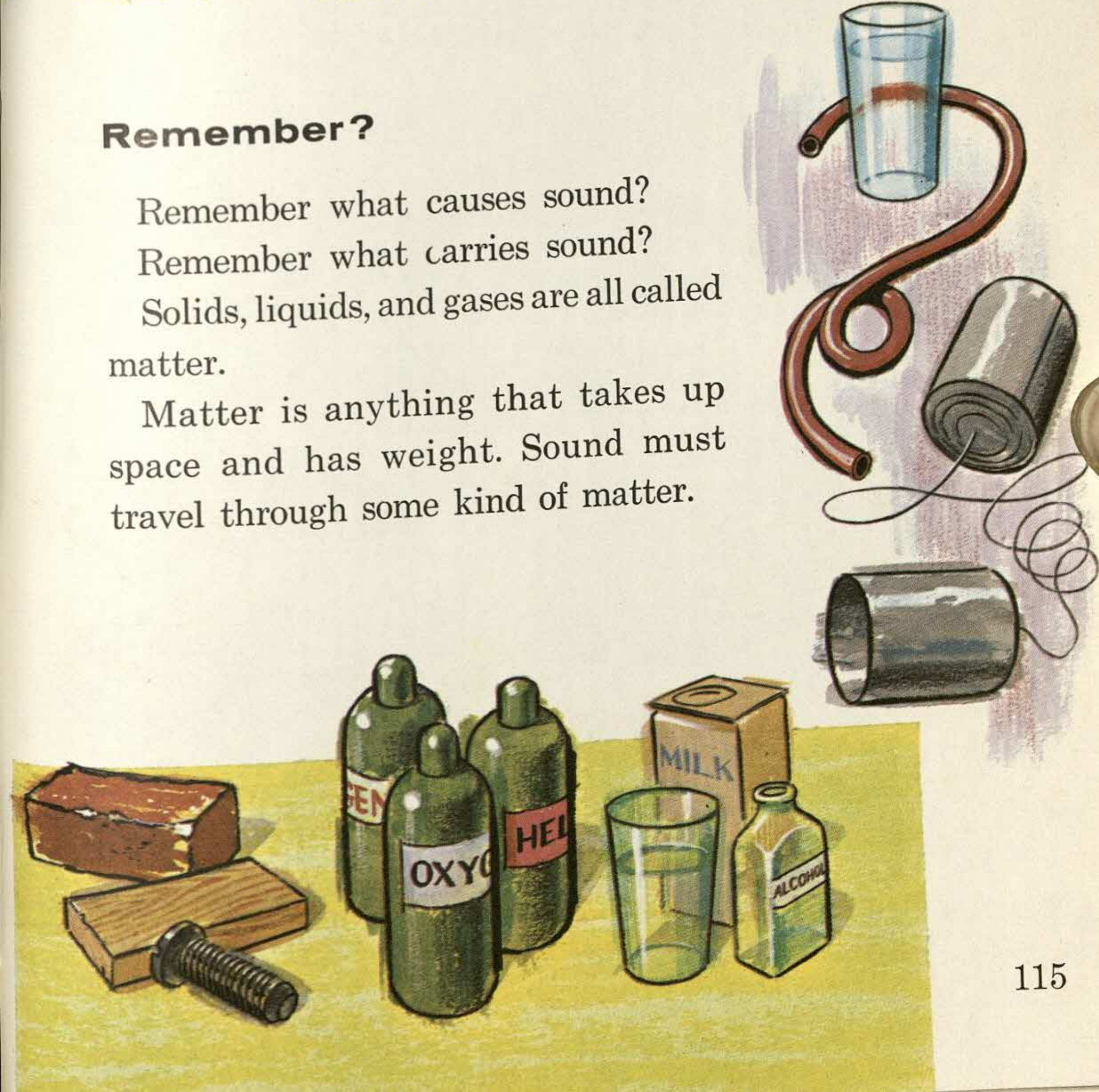
Remember?

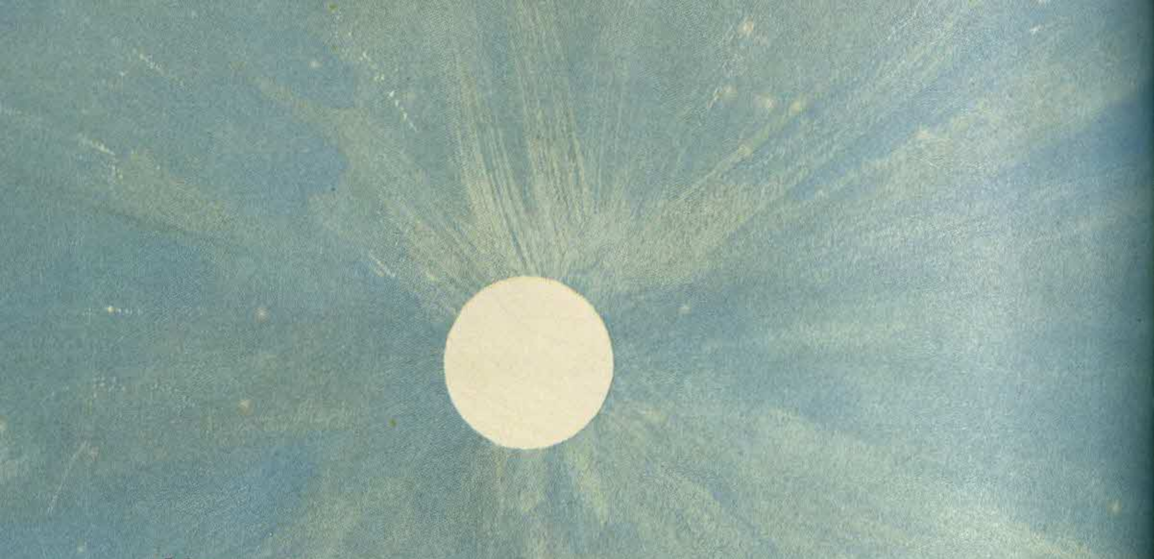
Remember what causes sound?

Remember what carries sound?

Solids, liquids, and gases are all called matter.

Matter is anything that takes up space and has weight. Sound must travel through some kind of matter.





How Does Light Travel?

How does light travel? Let's think. Is there air all the way to the sun? Then light must travel through empty—all empty—space.

Light travels very, very, very, very fast. Sounds travel quickly, too. Sounds in the air travel a mile in five seconds. Sounds in water and in solids travel even faster. But light travels much faster than that.

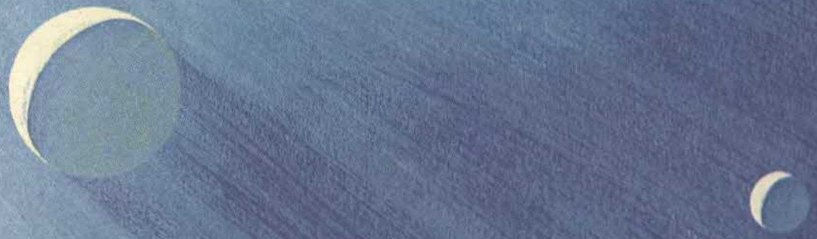
So we see the lightning, and then hear the thunder. We see the jet, and then hear its roar. We see the player hit the ball, and then we may hear the crack.

Light and Shadows

We get light from the sun and stars, from electricity, and from burning things. We get most of our light from the sun.

Hold a book up to the sunlight. Does the light of the sun go through the book? What do we call the darkness in the back of the book? Try some other objects. What does the sunlight travel through? What is a shadow?

Just as we have shadows, so does the earth. What part of the earth is in shadow? Where is it day? Where is it night?



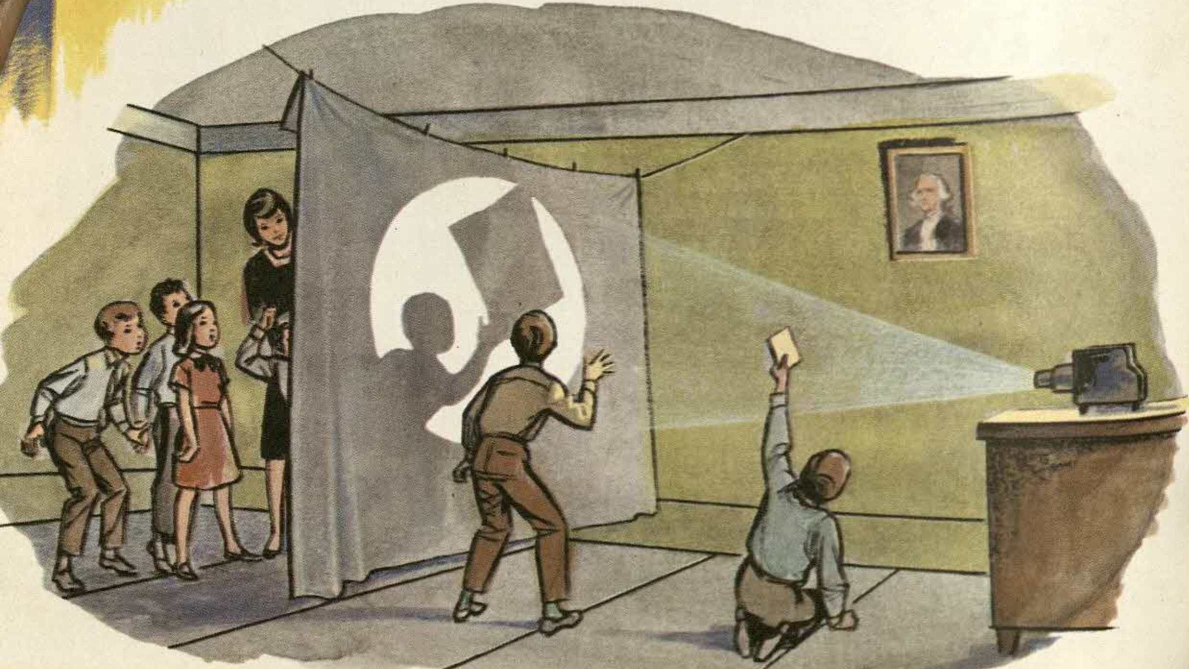
Shadow Fun

What shadow animals can you make? Why do your hands make shadows?

Does light travel around corners? Does sound travel around corners?

For some funny shadow tricks, do what the children in the picture are doing. How can the boy hold such a big book?

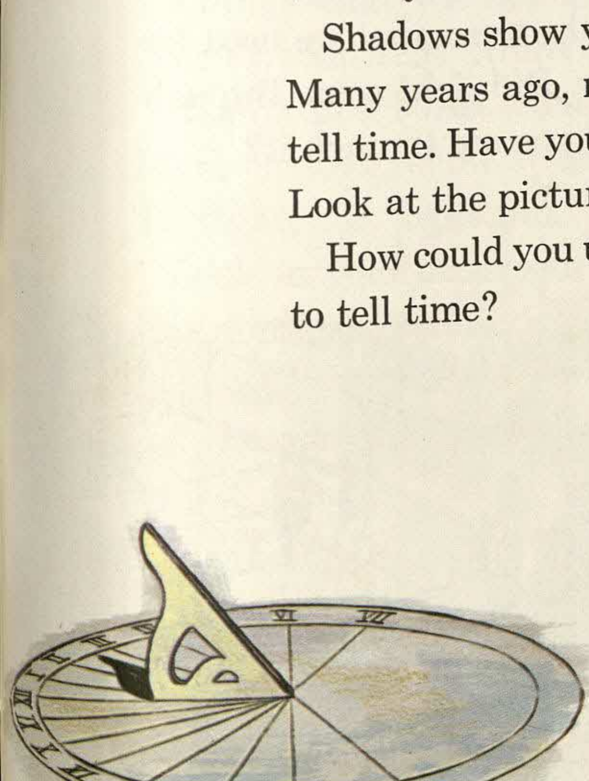
Think of some other shadow tricks to play.

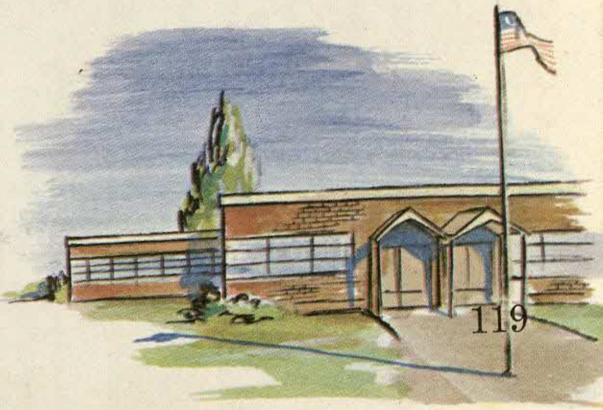


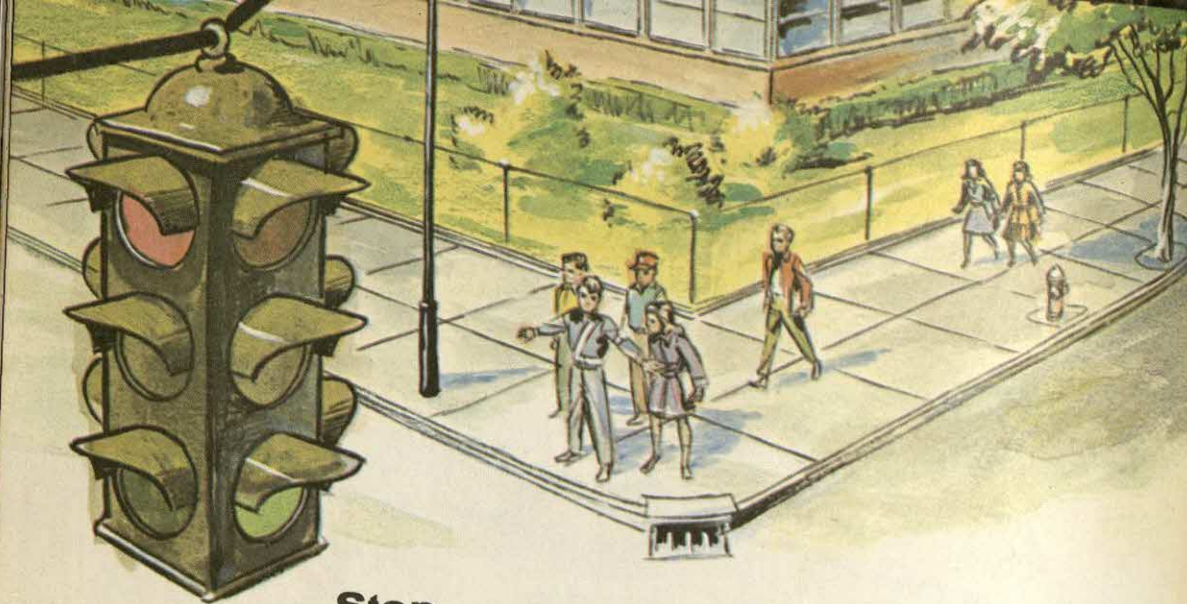
Have you ever played shadow tag? You are It if your shadow is tagged. Watch your shadow!

Shadows show you where the sun is. Many years ago, men used shadows to tell time. Have you ever seen a sundial? Look at the picture of the sundial.

How could you use a flagpole or a tree to tell time?



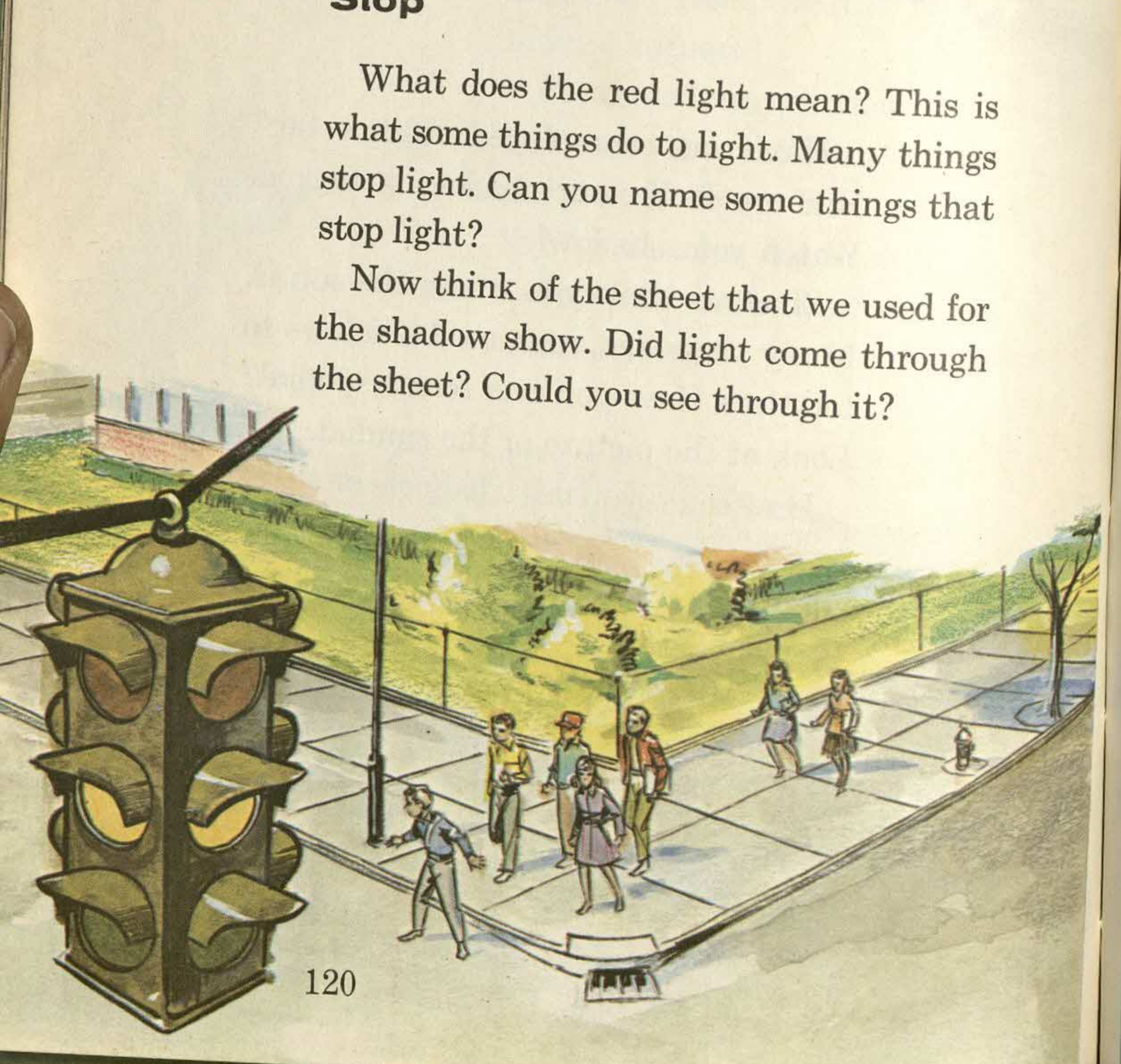


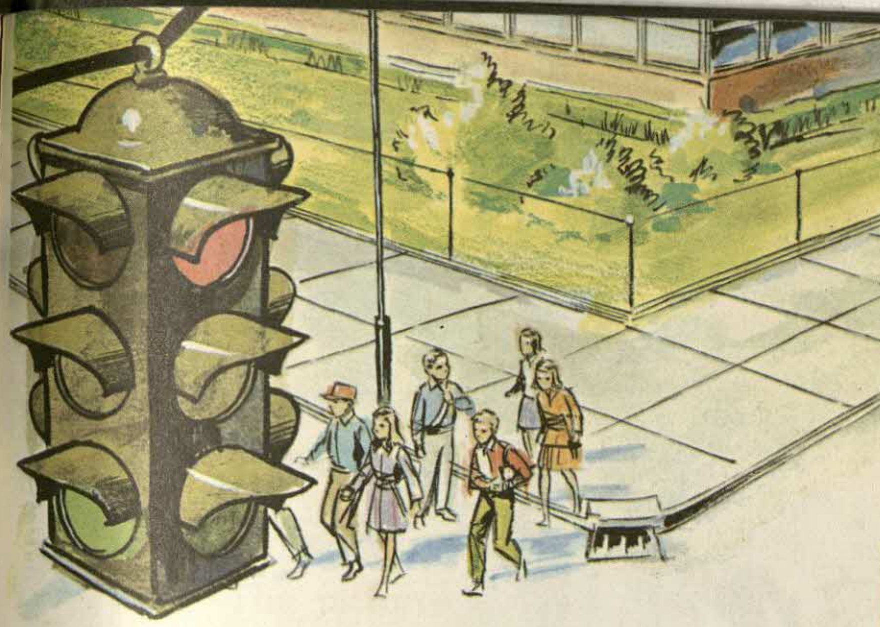


Stop

What does the red light mean? This is what some things do to light. Many things stop light. Can you name some things that stop light?

Now think of the sheet that we used for the shadow show. Did light come through the sheet? Could you see through it?





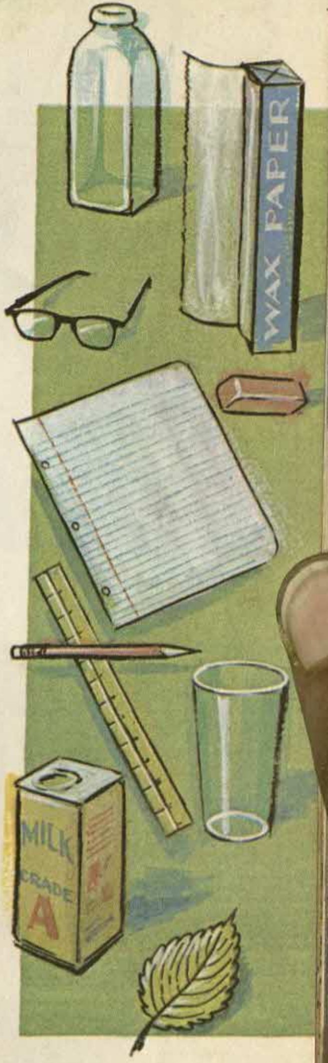
Go

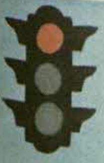
What does a green traffic light mean? Light will go through some things. We can see through these things.

Things that we can see through are called transparent (trans PA rent).

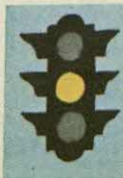
Take three boxes. Mark one box red. Mark one box yellow. Mark one box green. These are for "light fun."

Look in your classroom for some of the things in the picture. Hold each thing up to the light. Can you see light? Can you see through it? Do you know which box to put it in?

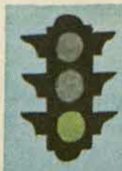




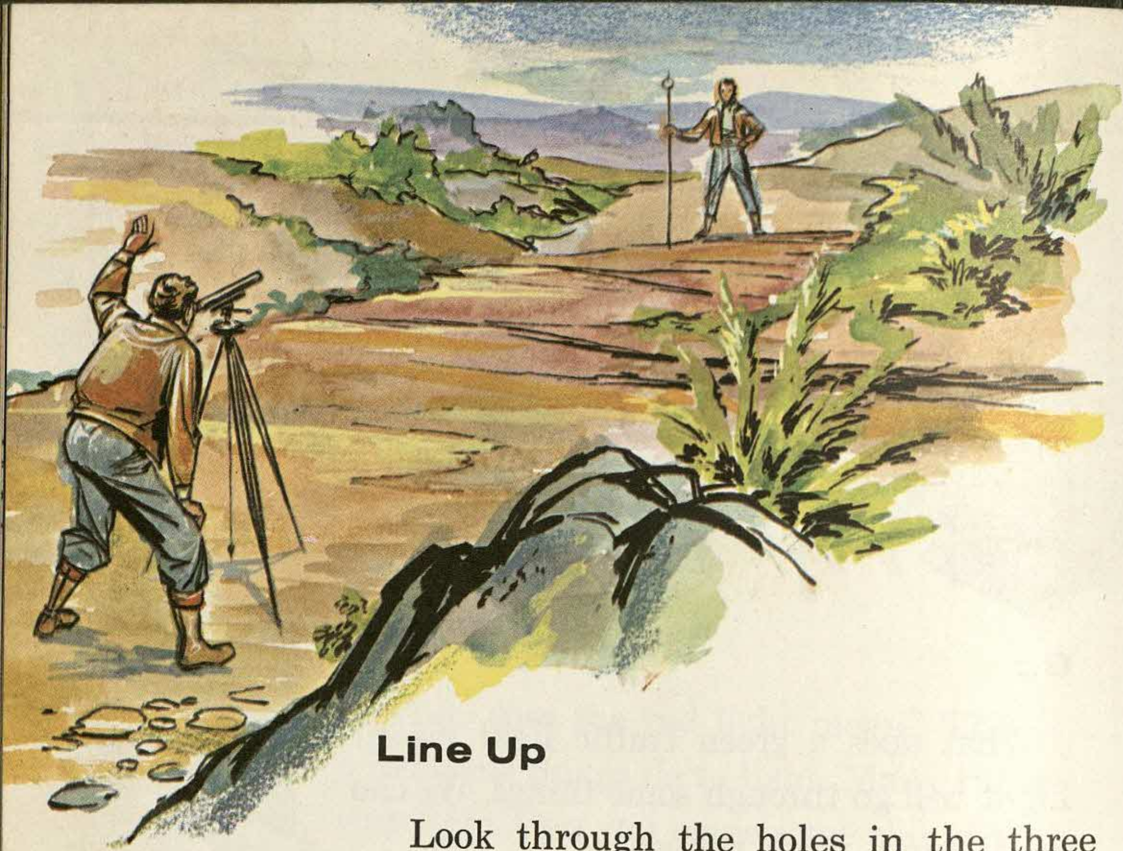
Light is stopped.



Some light goes through, but we cannot see through it.



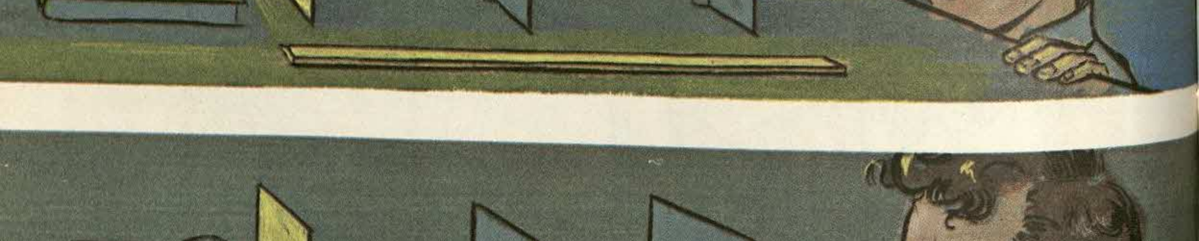
Light goes through.

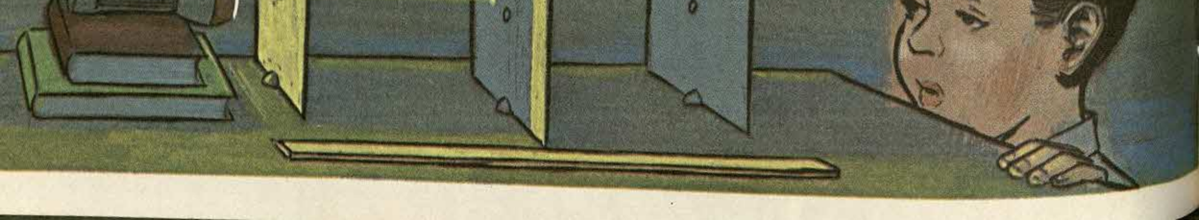


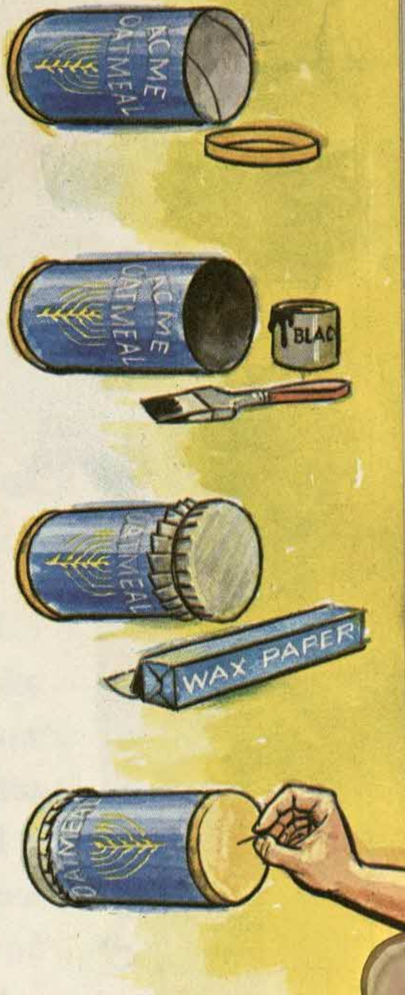
Line Up

Look through the holes in the three cardboards. What do you see?

Move the middle cardboard to one side. What happens? Why?



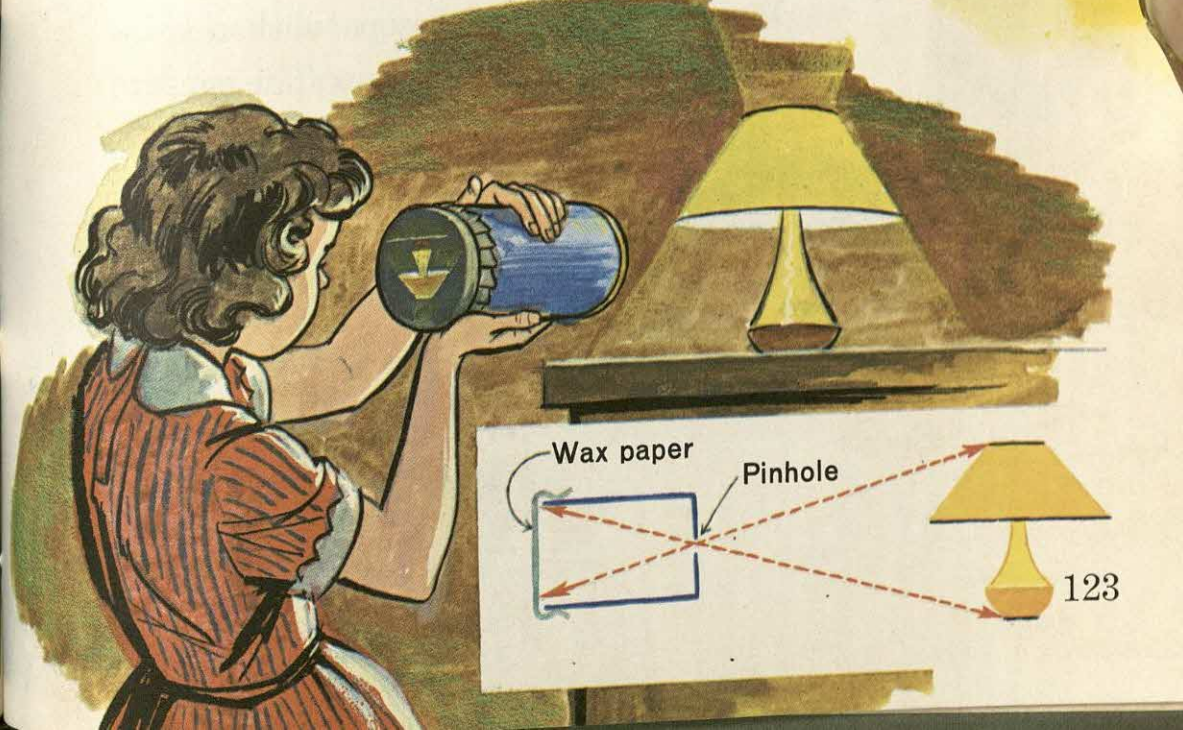


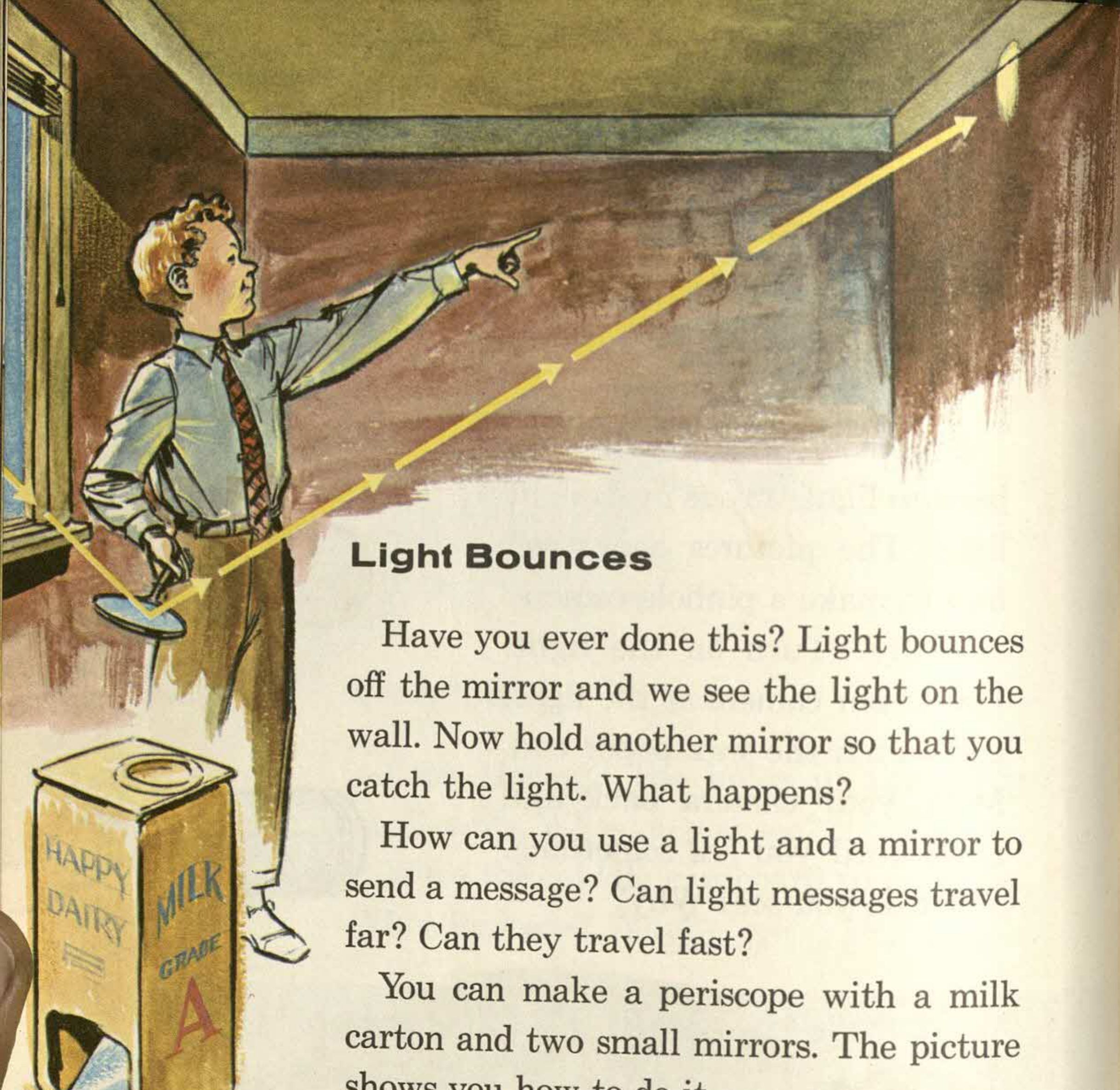


Picture Please

A pinhole camera will work because light travels in straight lines. The pictures show you how to make a pinhole camera.

Ready? Turn on the light. Point your camera at the light, and watch the wax paper end. Move your camera back and forth until you see something. What do you see? Why?



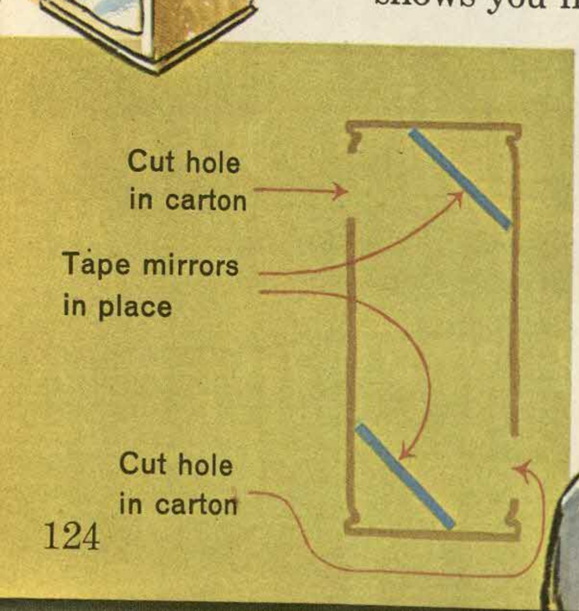


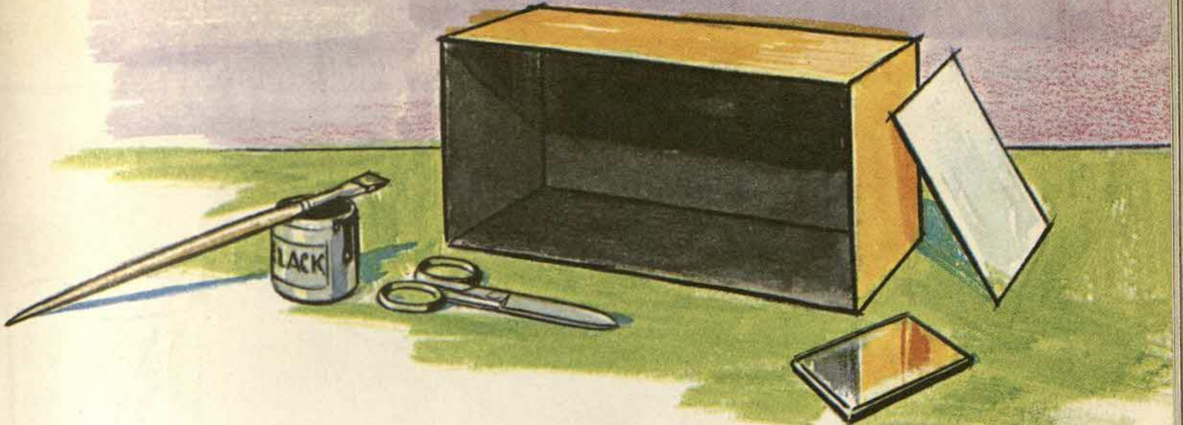
Light Bounces

Have you ever done this? Light bounces off the mirror and we see the light on the wall. Now hold another mirror so that you catch the light. What happens?

How can you use a light and a mirror to send a message? Can light messages travel far? Can they travel fast?

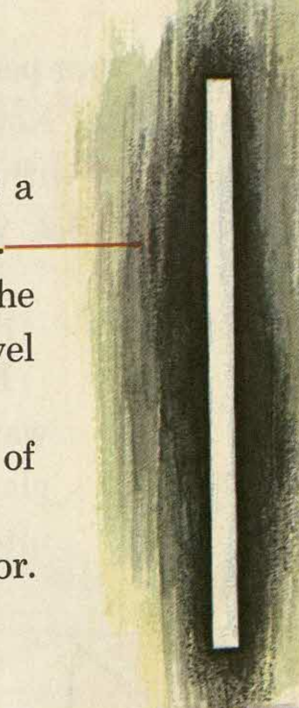
You can make a periscope with a milk carton and two small mirrors. The picture shows you how to do it.





What Happens?

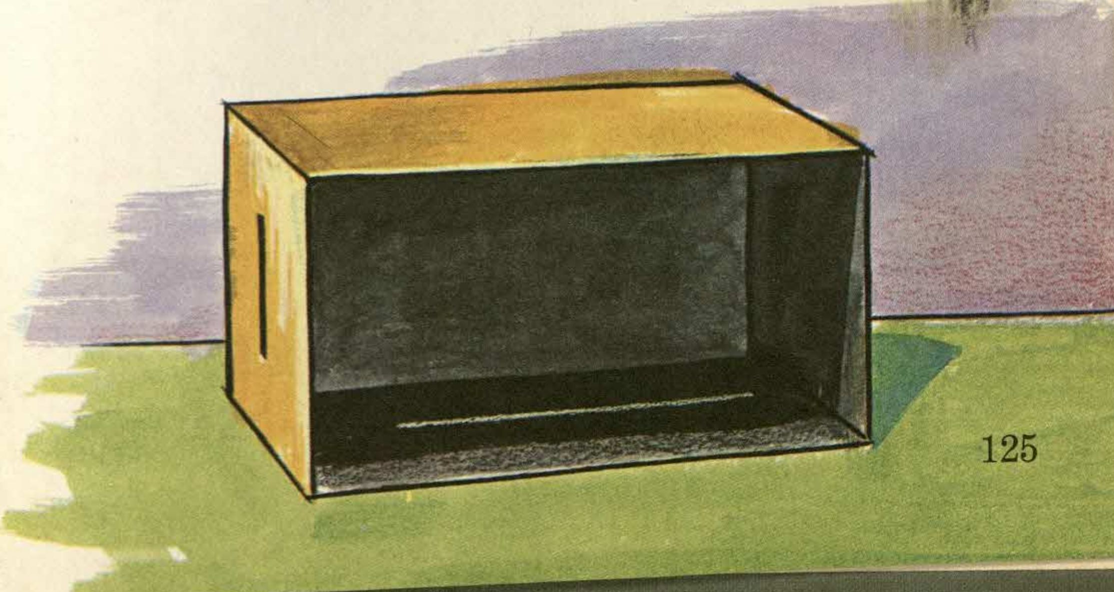
Blacken the inside of a shoe box. Cut a slit in one end of the box. Cut it this size.

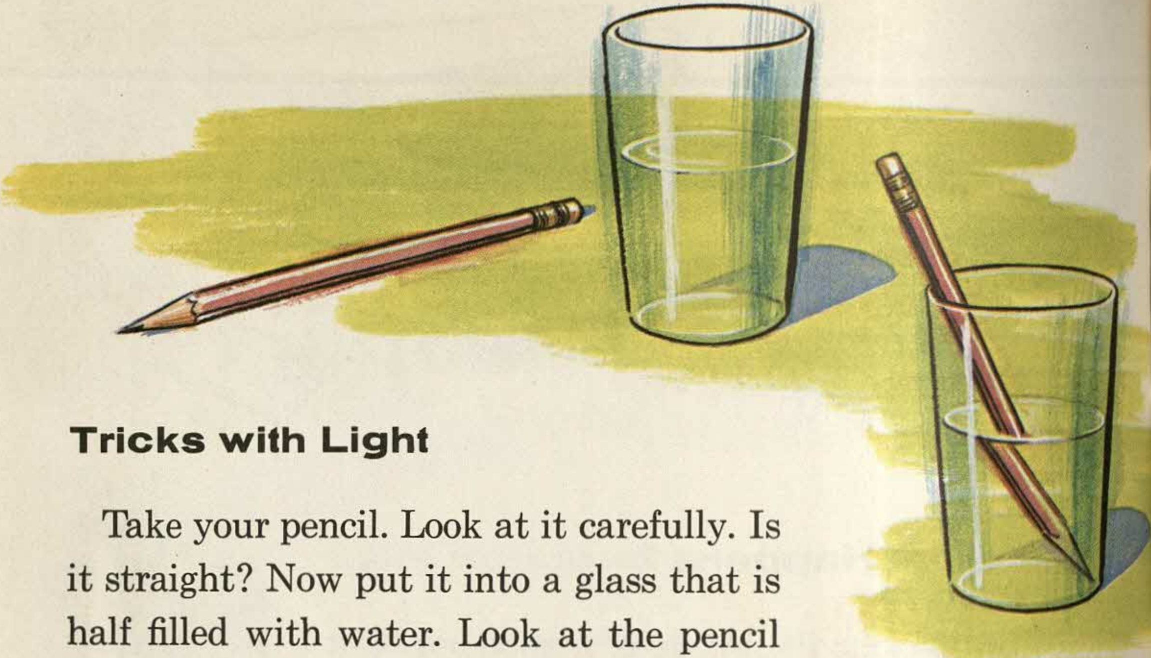


Stand the box on its side and put it in the sunlight. What do you see? Does light travel in straight lines?

Put a mirror in the light on the bottom of your box. What happens?

Use white paper instead of the mirror. What happens?

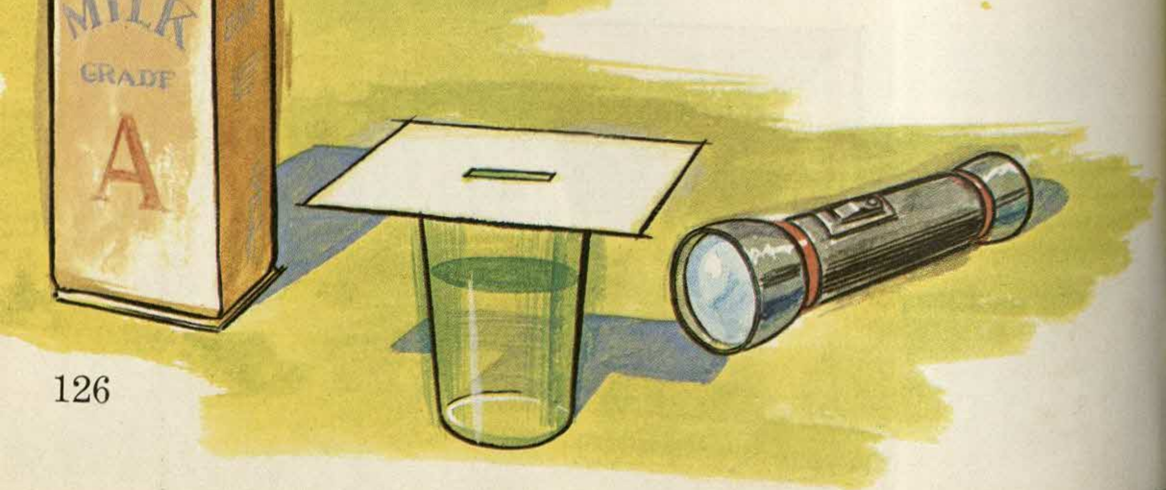




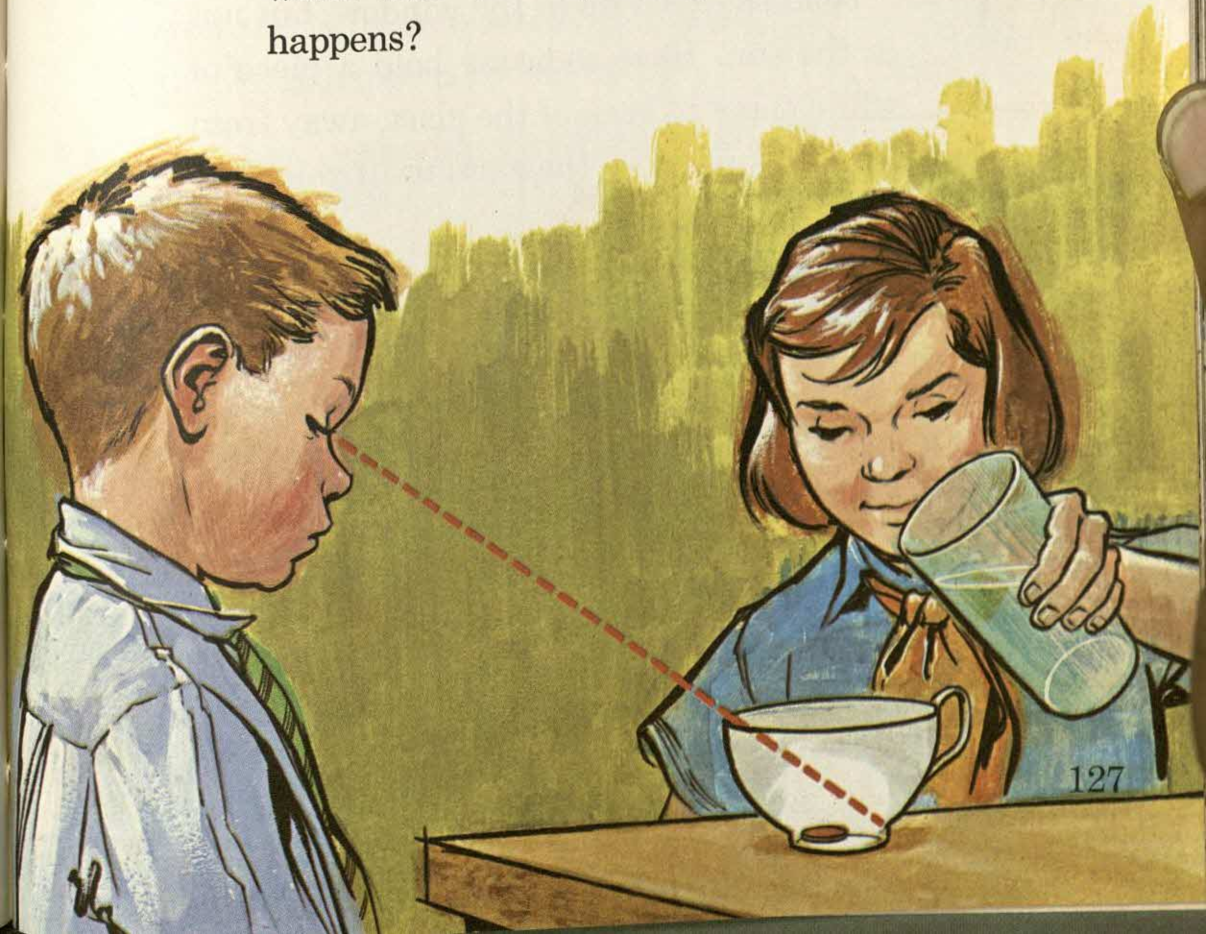
Tricks with Light

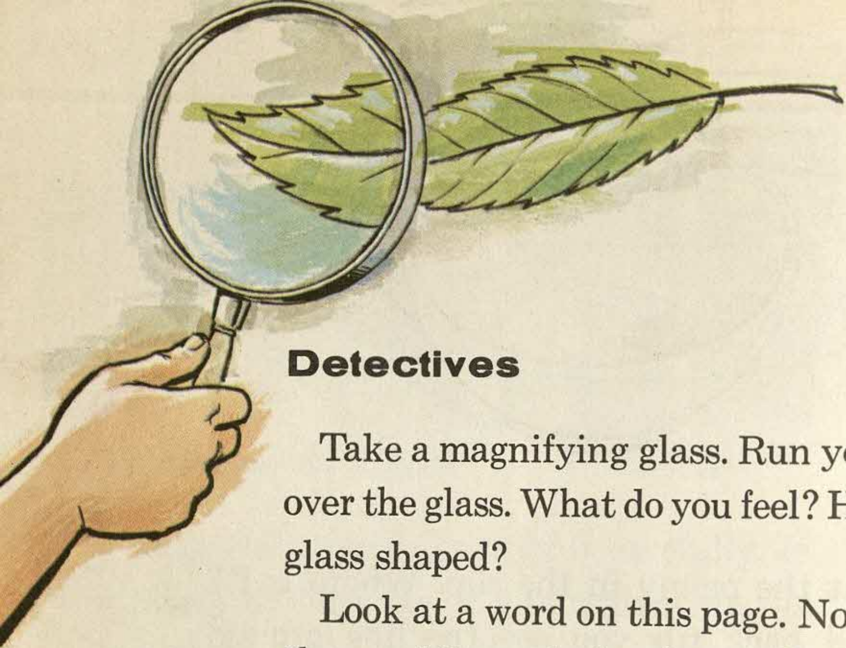
Take your pencil. Look at it carefully. Is it straight? Now put it into a glass that is half filled with water. Look at the pencil from all sides. What do you see?

Put a few drops of milk into a glass of water. Put the card with the slit over the glass. Now shine the light from the flashlight into the water. What happens?



Put the penny in the cup. Where is it? Stand back till you see the line around the bottom of the cup. Can you see the penny? Now have someone slowly pour water into the cup. Keep looking. What happens?





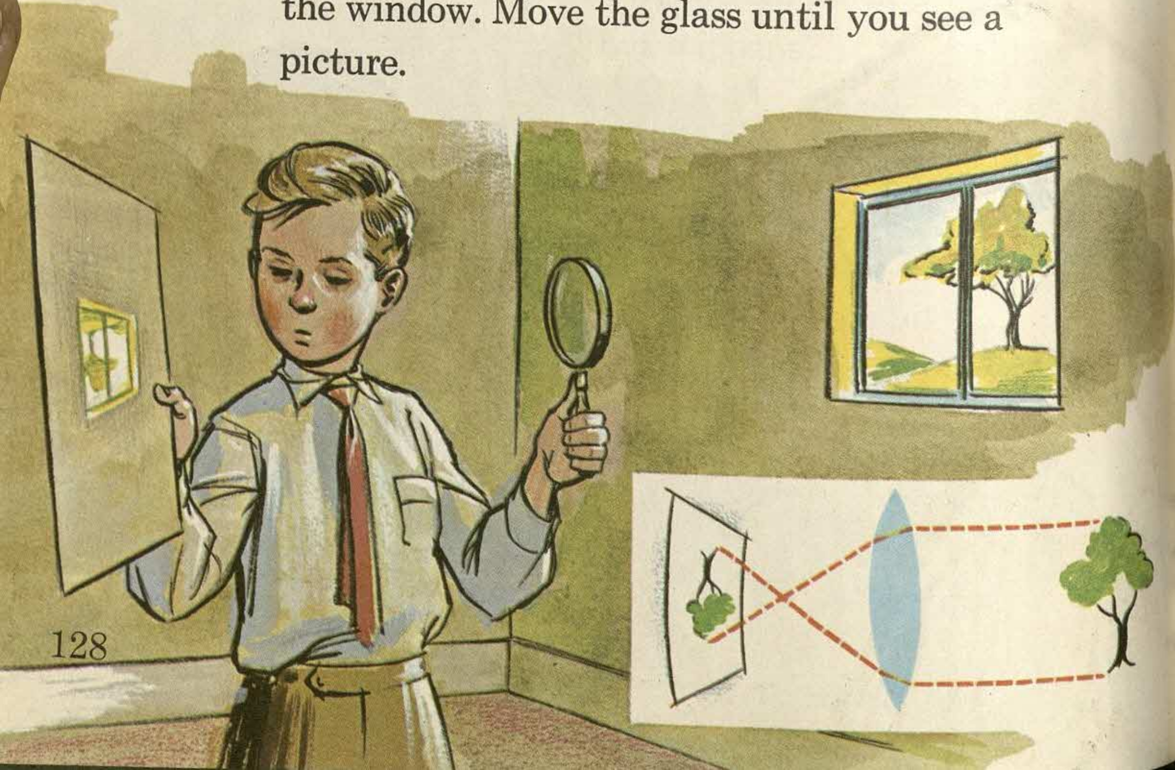
Detectives

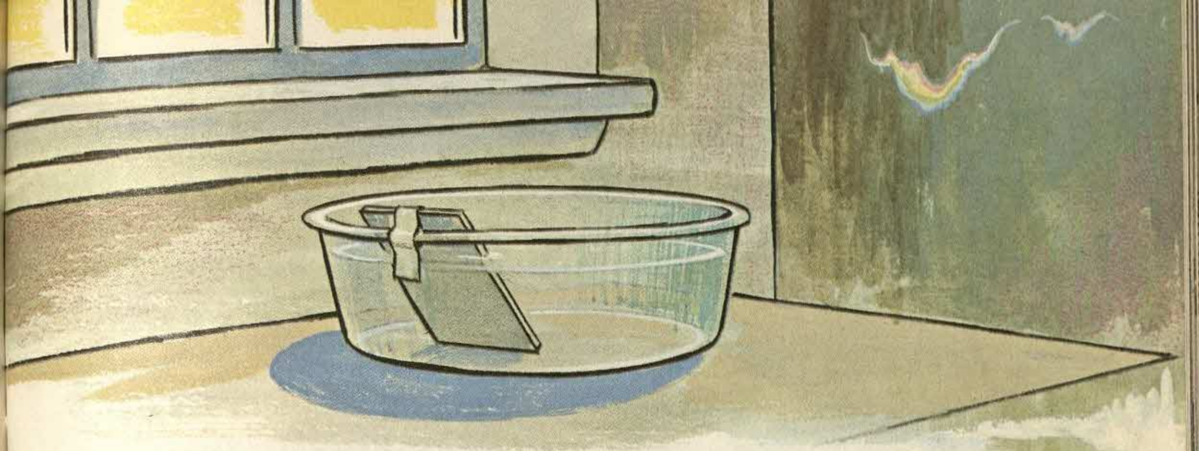
Take a magnifying glass. Run your finger over the glass. What do you feel? How is the glass shaped?

Look at a word on this page. Now look at the word through the glass. What happens?

Take a hair from your head. Look at it under the glass. What do you see?

Hold the glass up to the window, but not in the sun. Have someone hold a piece of white paper in back of the glass, away from the window. Move the glass until you see a picture.





Many from One

Tape a mirror to a pan of water. The picture shows you how. Put the pan of water in the sunlight. What happens?

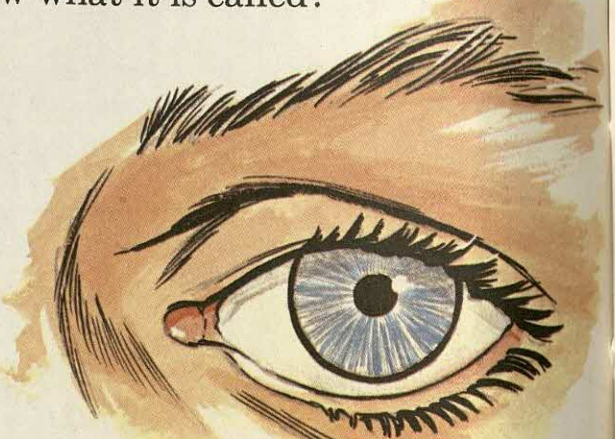
Hold a prism in the sunlight. Turn it and watch the light on a white cardboard or a wall. What happens to the light?

Look!

We see light with our eyes. Look at your eyes in a mirror. What color are they?

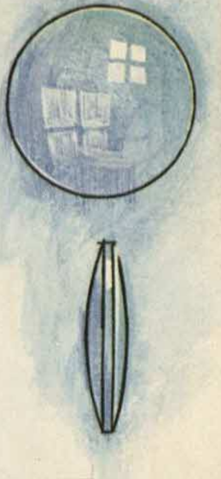
Look at your friends' eyes. You may see brown eyes, blue eyes, gray eyes, or green eyes.

Eyes are of many colors and many shapes. Do all eyes have a black spot in the center? Do you know what it is called?

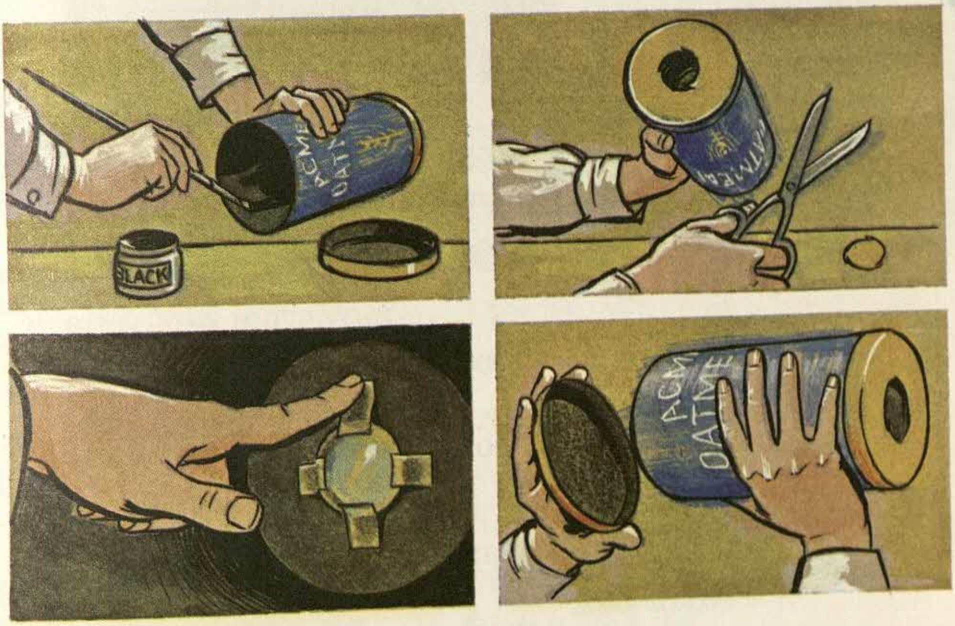


Take a lens that is thick in the center. It will look like this.

Can you see through it?

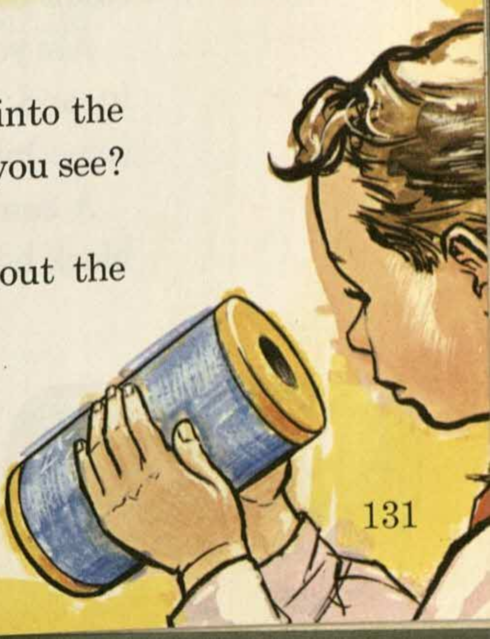


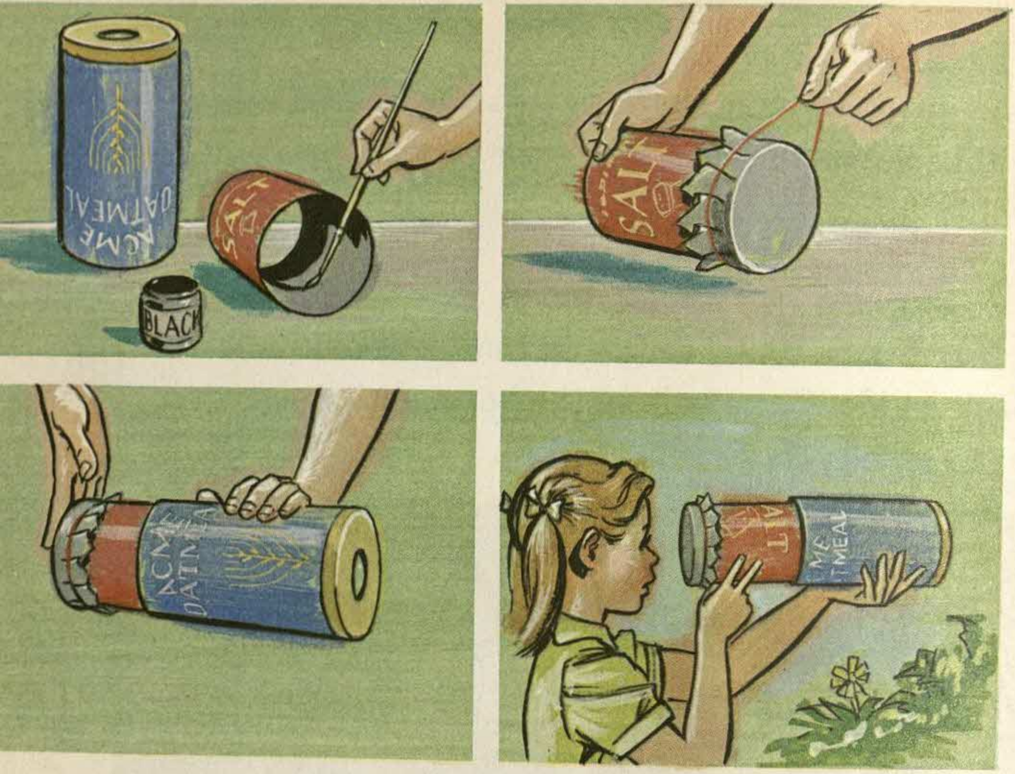
Now take a round empty carton. Paint it black inside. Cut a hole in the bottom and tape the lens there.



Put the lid on the box. Look into the box through the lens. What do you see? How does the lens look? Why?

What do you know now about the black spot in your eye?



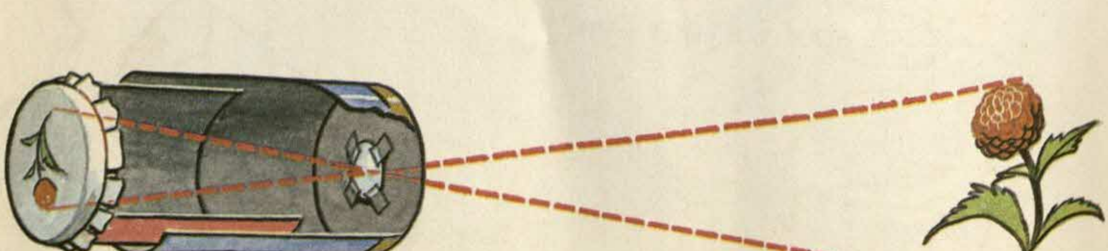


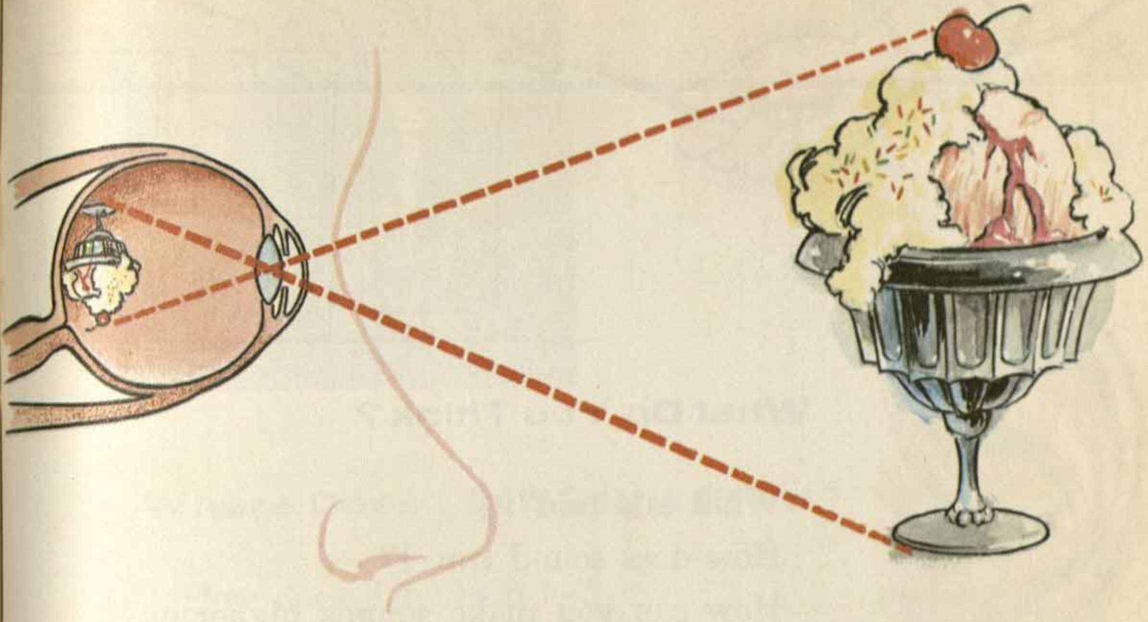
What Do You See?

Your black box with the lens can become a camera. The pictures show you what to do. Use wax paper to cover the end of the small box.

Are you ready to test? Move the small box in and out of the big box until you see something.

A camera can make a picture. Can your black box make a picture?

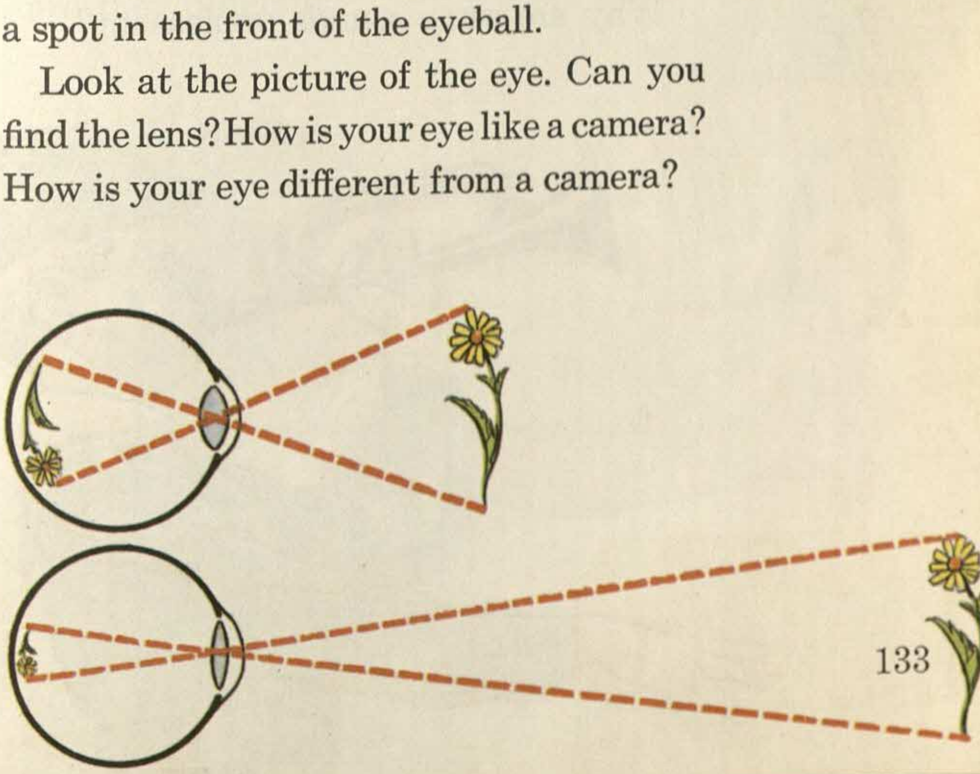




Close your eye. Put your finger on your eyelid. Now move your eye around. What do you feel?

The eyeball is round. Light comes through a spot in the front of the eyeball.

Look at the picture of the eye. Can you find the lens? How is your eye like a camera? How is your eye different from a camera?



What Do You Think?

What is sound?

How does sound travel?

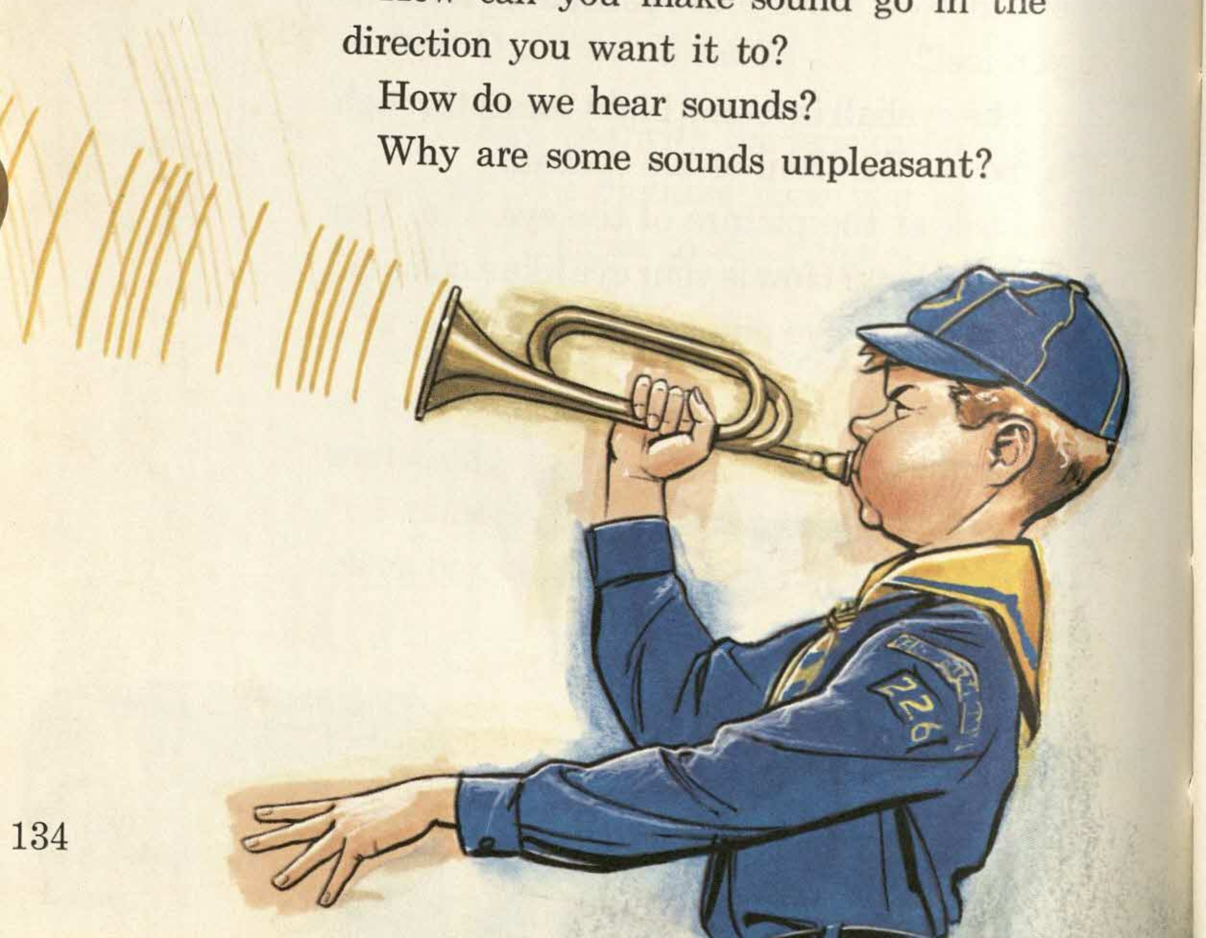
How can you make sounds higher or lower?

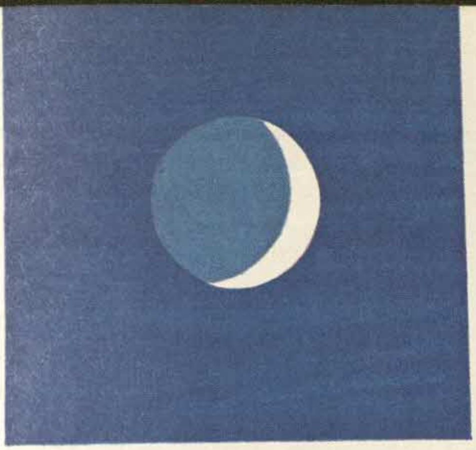
What is an echo?

How can you make sound go in the direction you want it to?

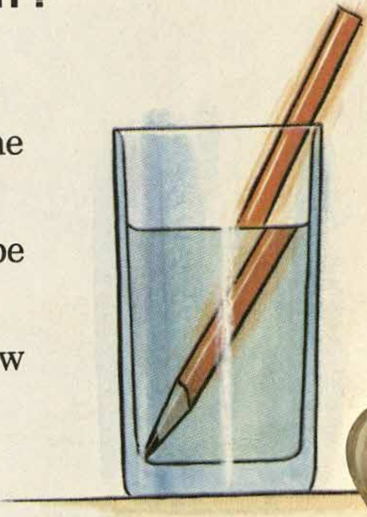
How do we hear sounds?

Why are some sounds unpleasant?





Where Does Light Come From?



How does light help us?

What is the difference between the moon's light and the sun's light?

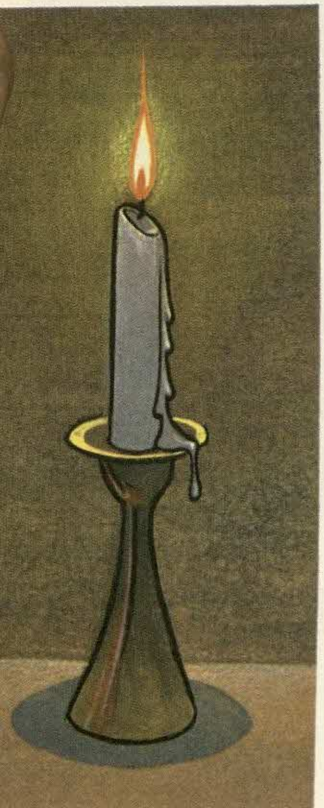
Why do objects in water appear to be in a different place than they are?

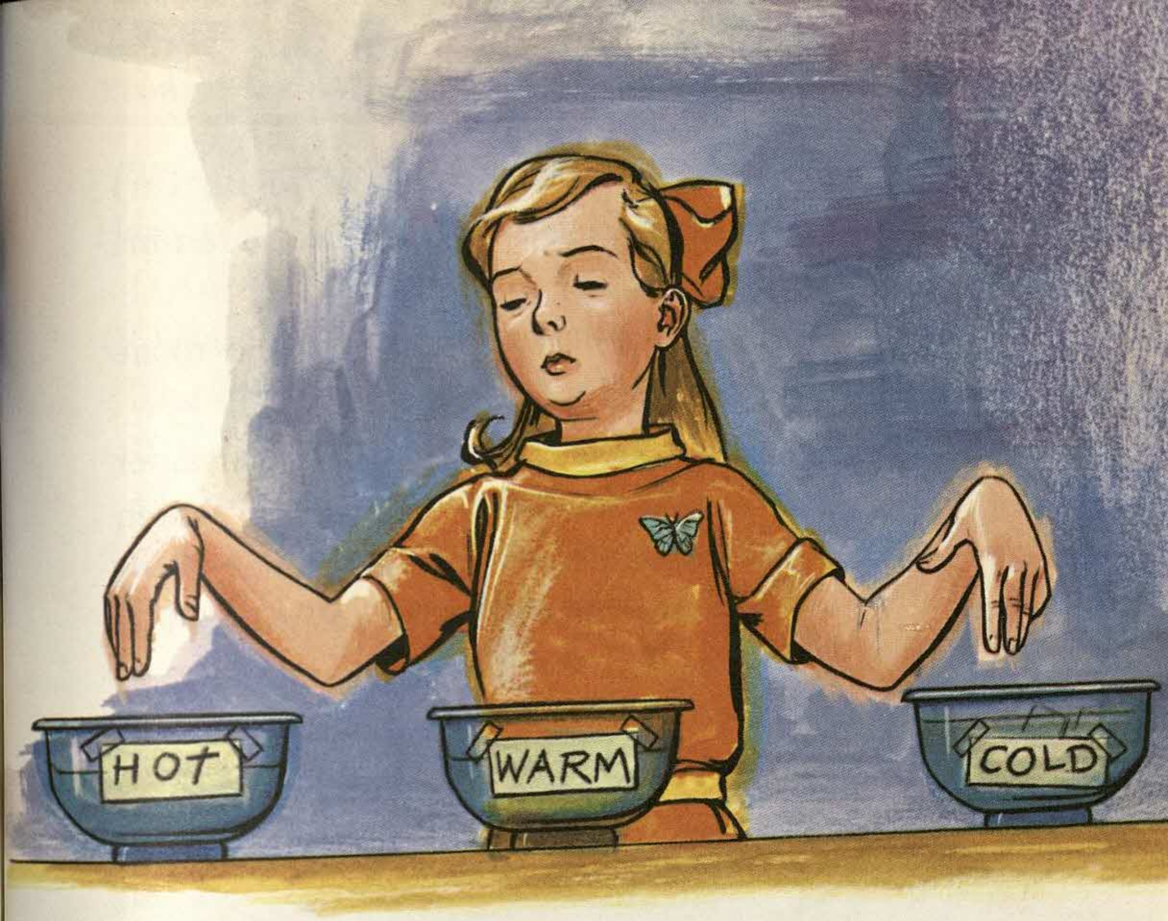
How are light and sound alike? How are they different?

Heat

Some things are solid.
Some things are liquid.
Some things are gas.

Can solids change into liquids?
Can liquids change into gases?
What do you think must be done to make these changes?





How Does It Feel?

Prepare three containers of water. Place your left hand in the left container and your right hand in the right container. Describe what you feel.

Put your left hand in the middle container. How does it feel?

Put your right hand in the middle container. Describe how it feels.

We cannot describe the temperature of a substance very clearly by our sense of touch.

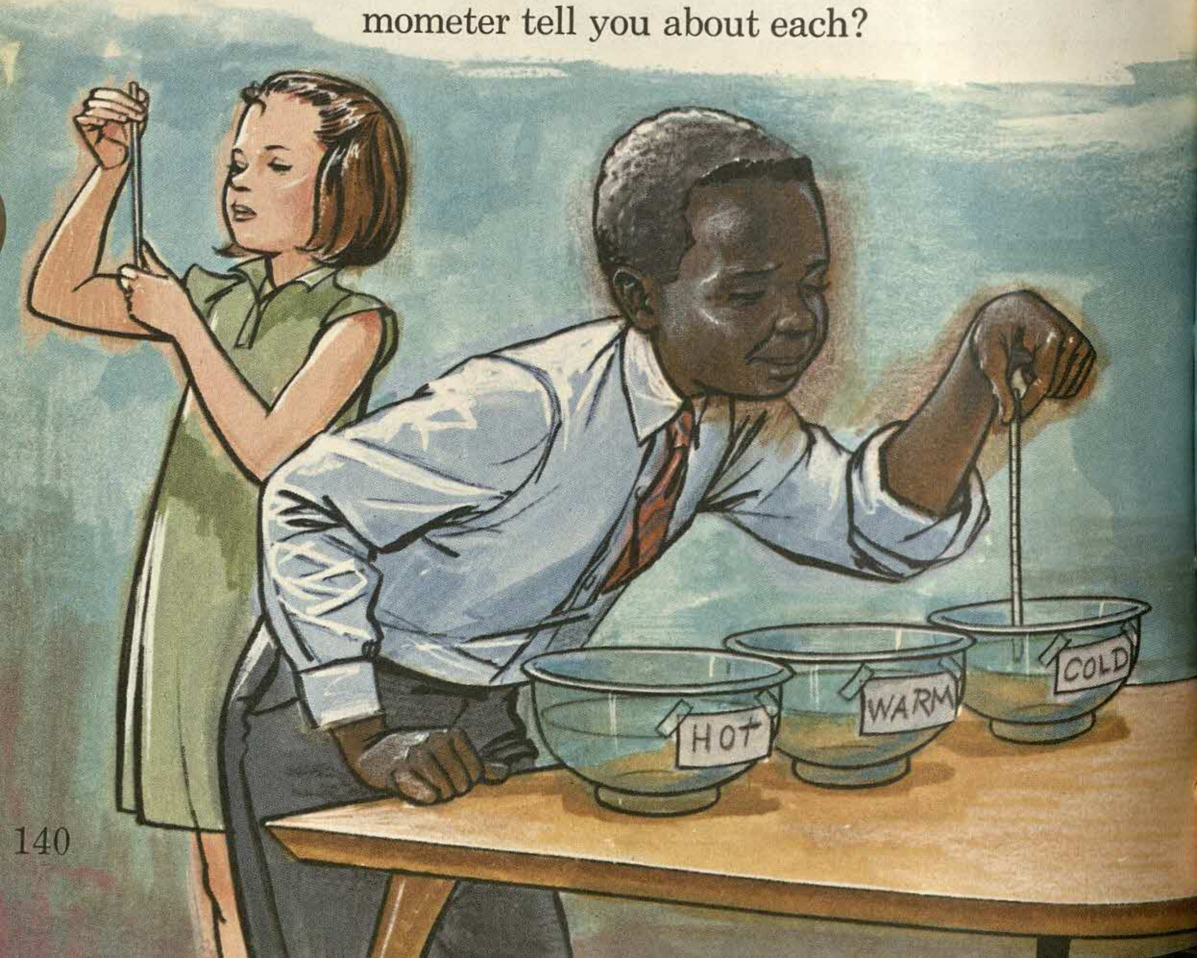
What Happens?

A thermometer (ther MOM uh tur) is used to measure temperature. Examine a thermometer carefully.

Record the temperature of the room. Is there much heat in the room?

Place the thermometer in a container filled with ice cubes and water. Watch the thermometer. What happens?

Fill one container with hot water. Fill another with cold water and another with warm water. Place the thermometer in each container. What does the thermometer tell you about each?



Thermometers

There are many kinds of thermometers. Here are two very common kinds.

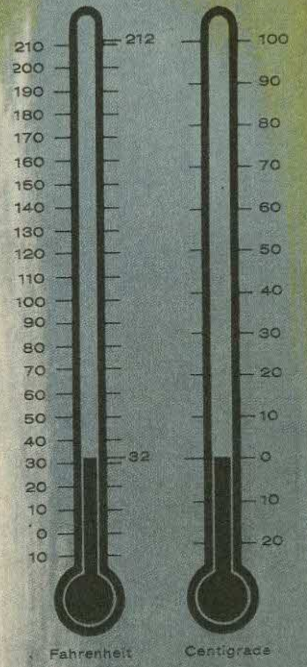
One is called a Fahrenheit (FAR un hite) thermometer.

The other one is called a Centigrade (SEN tuh grayd) thermometer.

Place both the Centigrade and the Fahrenheit thermometers in ice water.

What is the temperature reading on each?

Boil some water. Take the temperature with each thermometer.



Graphs

Fill a beaker with water.

Place a thermometer in the beaker. What is the temperature of the water? Find this number on the graph along the temperature line.

Place a mark on the graph where this line crosses the zero line. You will find the zero along the time line.

Now begin to heat the water.

What is the temperature after 3 minutes?

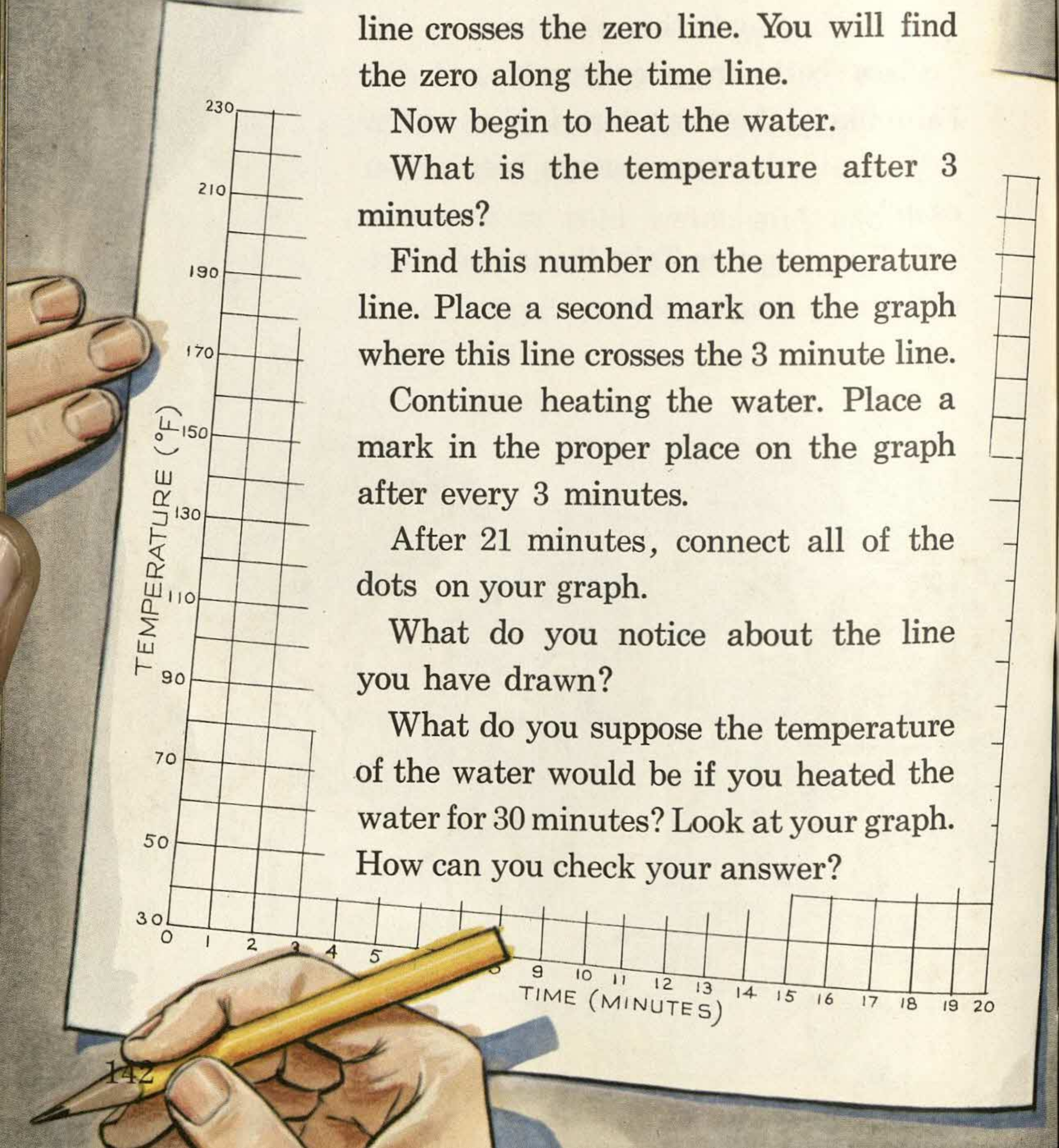
Find this number on the temperature line. Place a second mark on the graph where this line crosses the 3 minute line.

Continue heating the water. Place a mark in the proper place on the graph after every 3 minutes.

After 21 minutes, connect all of the dots on your graph.

What do you notice about the line you have drawn?

What do you suppose the temperature of the water would be if you heated the water for 30 minutes? Look at your graph. How can you check your answer?



The Ball and Ring

Some objects are solid. What does heat do to some solid objects?

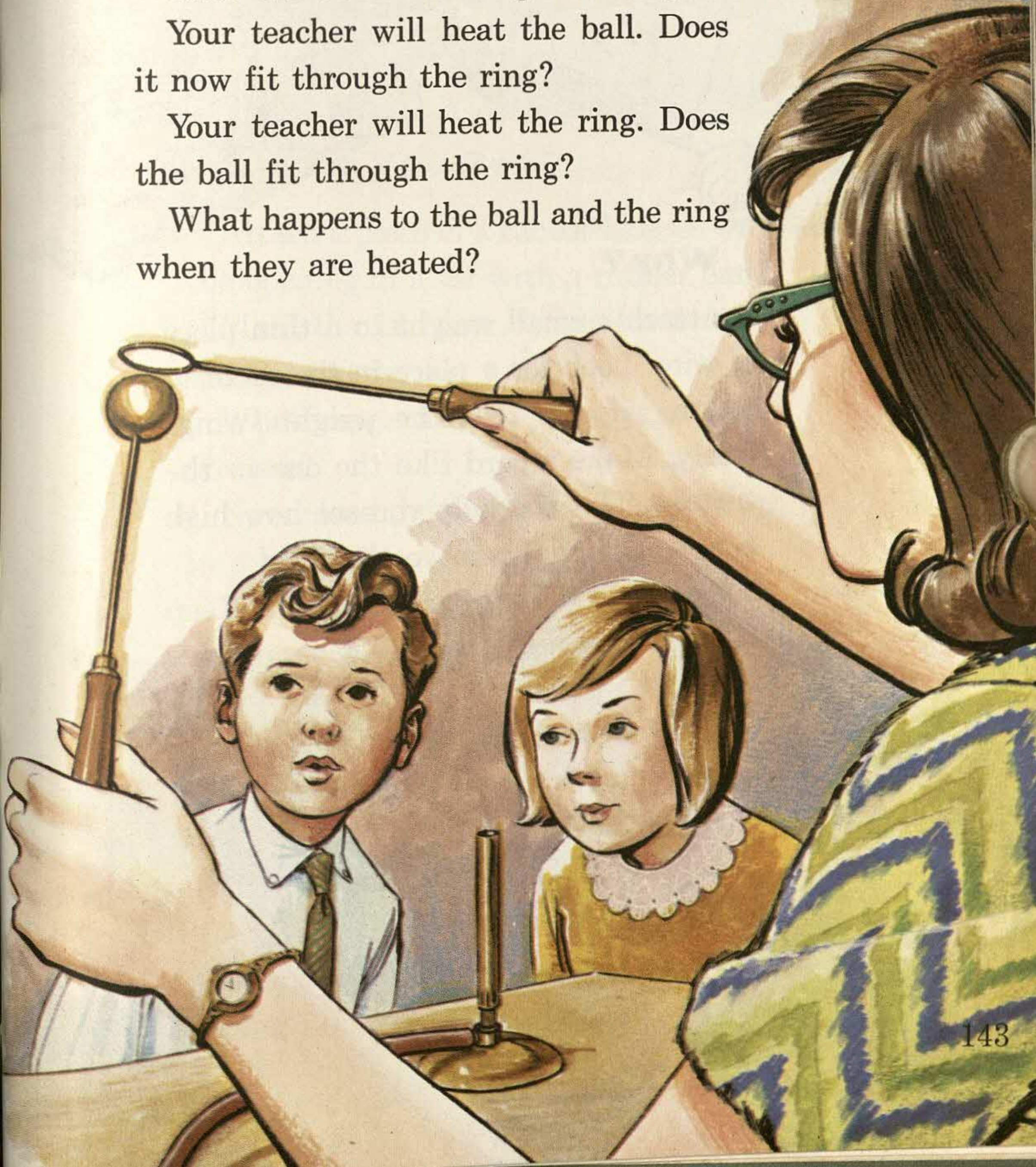
Your teacher will show you a ball and ring. Watch carefully.

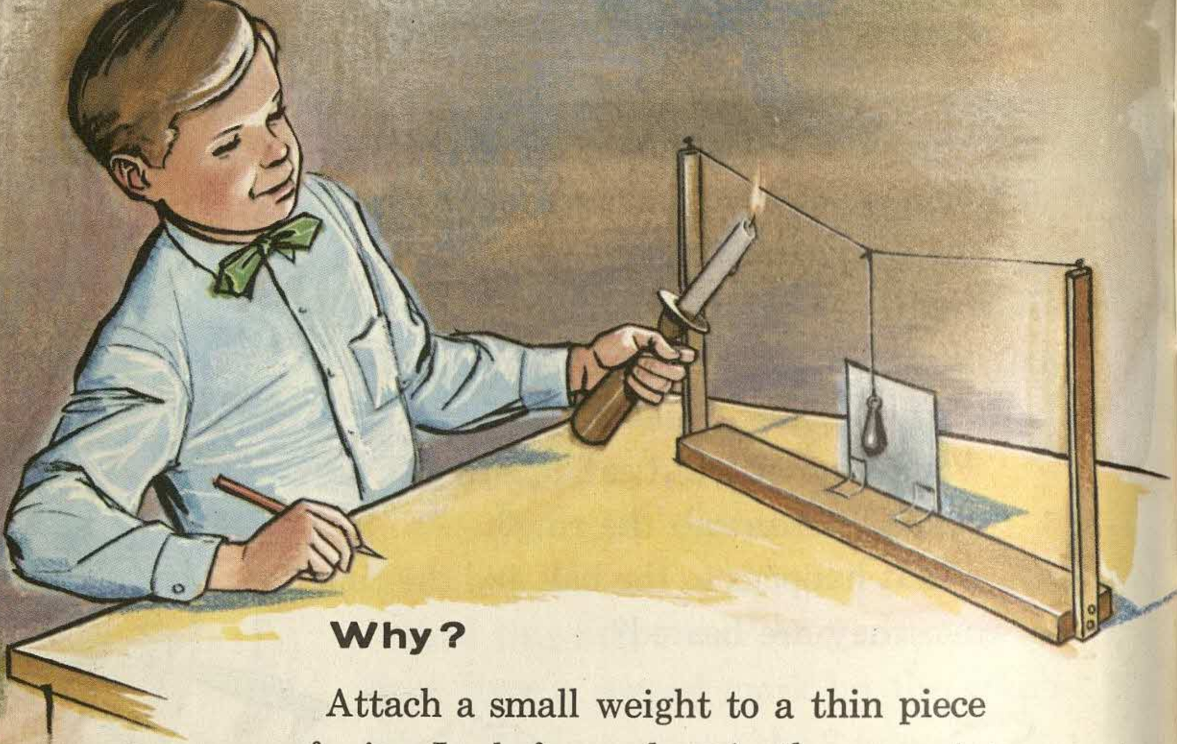
Does the ball fit through the ring?

Your teacher will heat the ball. Does it now fit through the ring?

Your teacher will heat the ring. Does the ball fit through the ring?

What happens to the ball and the ring when they are heated?





Why?

Attach a small weight to a thin piece of wire. Look for a place in the room to tie the wire so that the weight swings freely. Make a card like the one in the picture. This will help you see how high the weight hangs above the floor.

Now heat the wire with a candle. Keep heating the wire with the candle for several minutes. What do you see happening to the weight? Place a mark on the card when the weight no longer changes position.

Blow out the candle and watch the weight. What happens?

Touch the wire with a piece of cloth soaked in cold water. What happens now?

What Do You See?

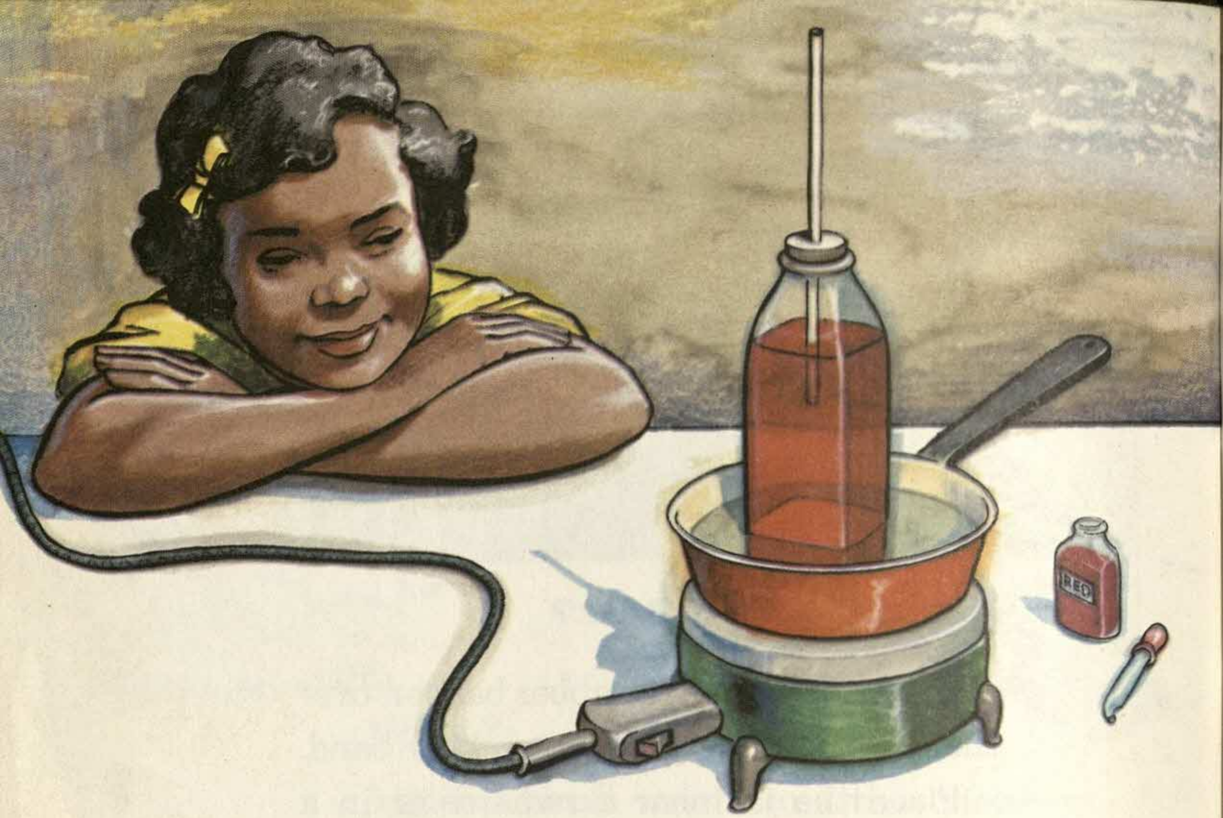
Attach a piece of a rubber balloon over the opening of a jar with a rubber band.

Place the jar near a radiator or in a warm window.

What happens? Can you explain what you see?

Now place the jar in a refrigerator or in a bowl of ice cubes.

What happens?



Watch Carefully

Fill a small bottle with water. Add a drop of vegetable dye or ink to color the water.

Place a glass tube or a clear plastic straw into a one-hole stopper. Put the stopper into the bottle.

Fix the tube or straw so that you can see the water level.

Heat the water slowly. What happens to the height of the liquid in the tube?

Now do you know how a thermometer works?

Cool the bottle with a damp cloth. What happens to the liquid in the tube?

Is There a Difference?

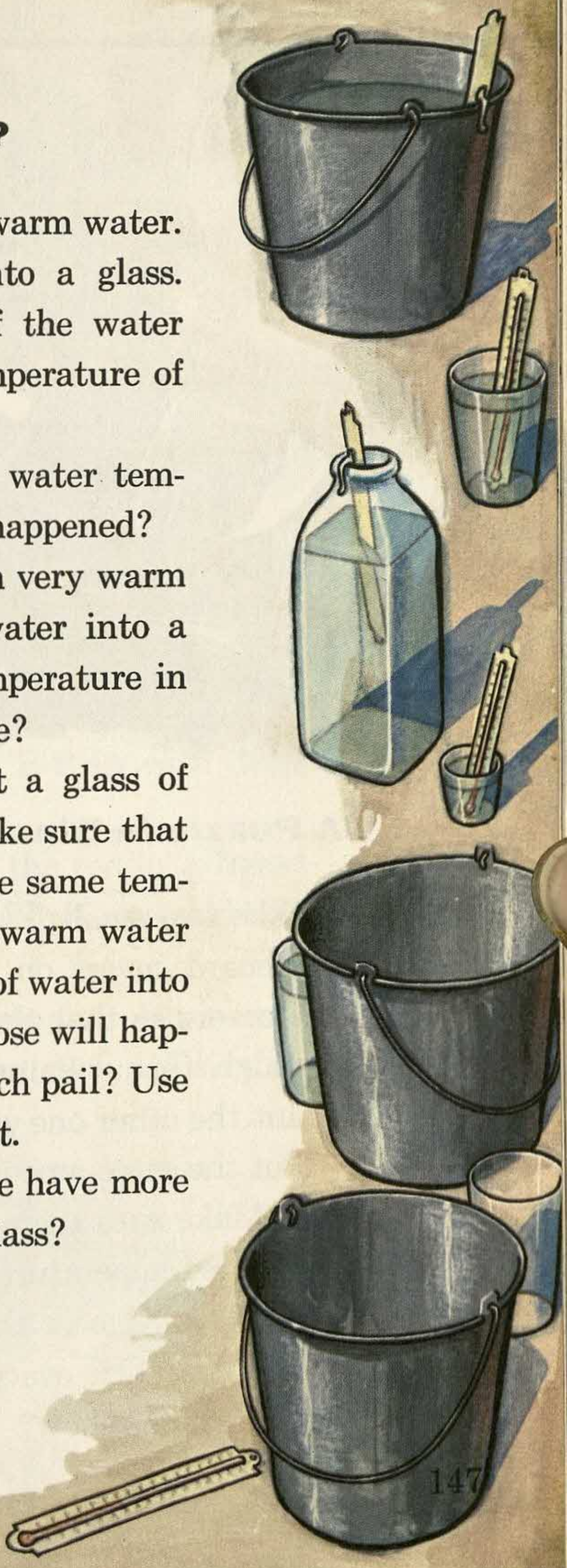
Fill a large pail with very warm water. Pour some of the water into a glass. What is the temperature of the water in the pail? What is the temperature of the water in the glass?

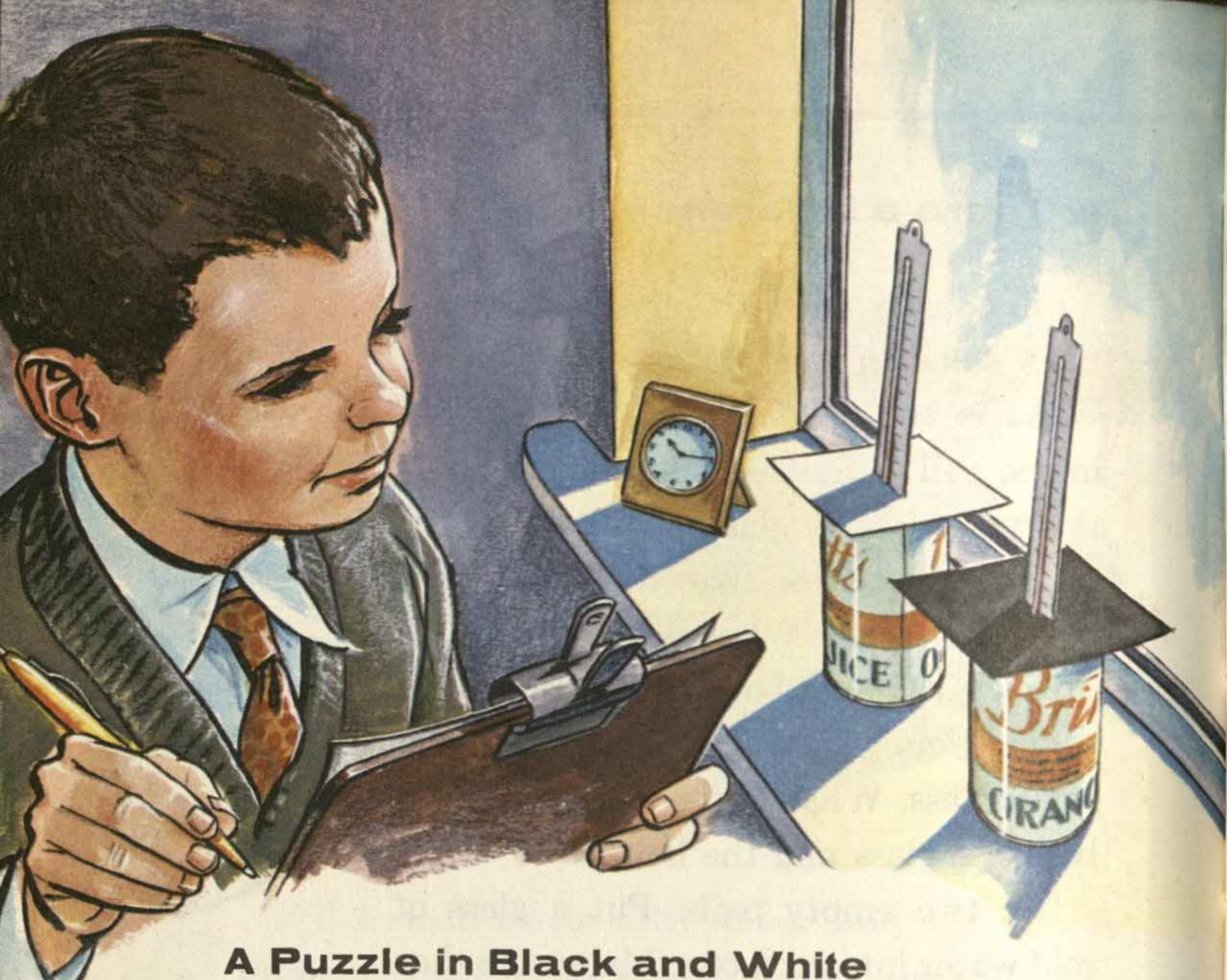
Wait 5 minutes. Take the water temperatures again. What has happened?

Now fill a milk bottle with very warm water. Pour some of this water into a small glass. What is the temperature in both the glass and the bottle?

Get two empty pails. Put a glass of cold water into each one. Make sure that the water in both pails is the same temperature. Pour the bottle of warm water into one pail. Pour the glass of water into the other. What do you suppose will happen to the temperature of each pail? Use your thermometers to find out.

Did the water in the bottle have more heat than the water in the glass?

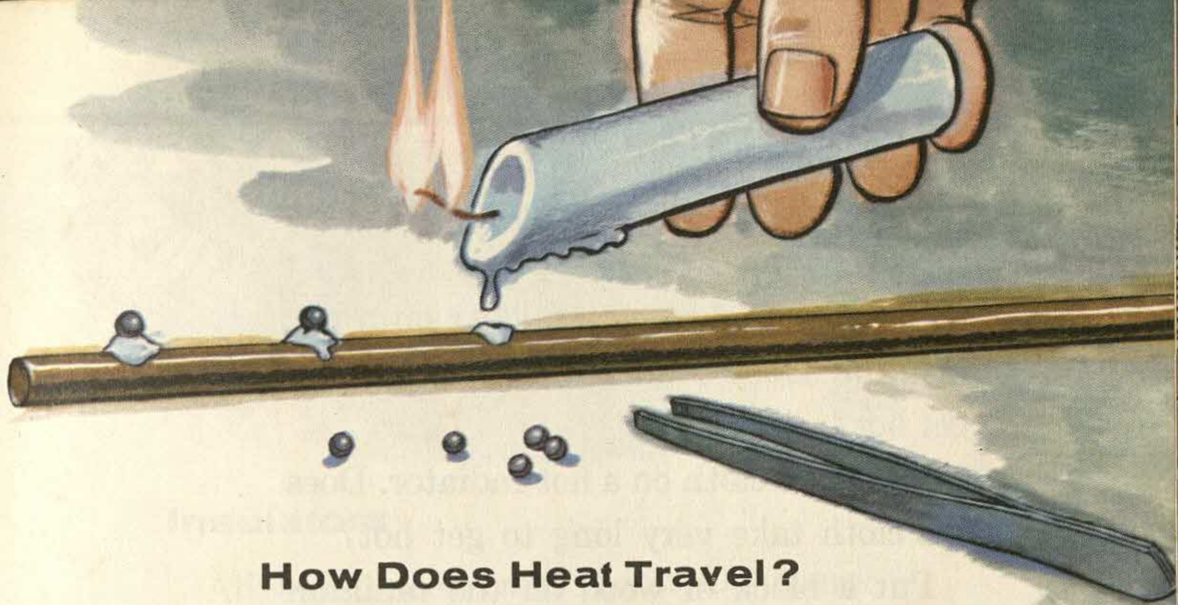




A Puzzle in Black and White

Take two small frozen juice cans. Put cardboard covers on them. Cut slits in the covers so that thermometers can fit through them. Paint one cover black. Paint the other one white.

Put the same amount of water in each can. Make sure the water in each can is the same temperature. Place the cans on a window ledge in the sunlight. Record the temperature every 15 minutes. What do the graphs show?



How Does Heat Travel?

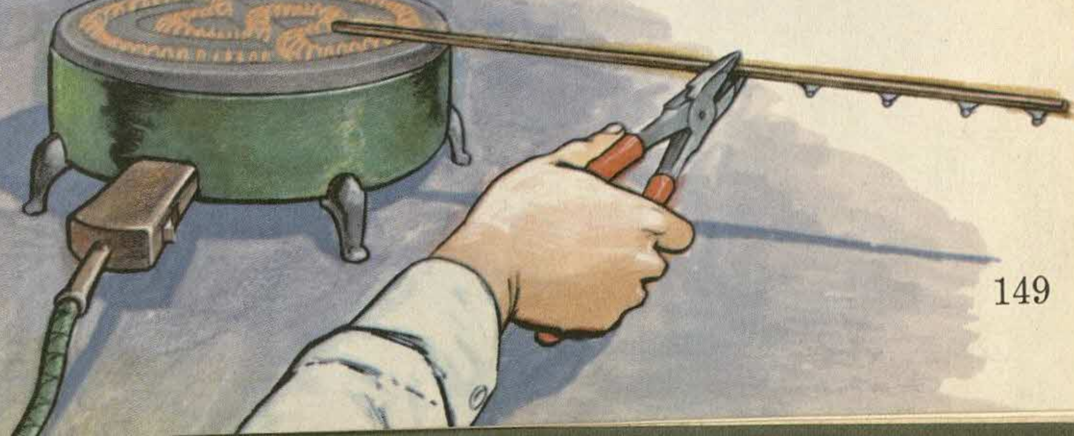
Have you ever touched the handle of a pan on a heated stove? How did the handle get so hot?

Put drops of wax 1 inch apart along a metal rod. Place a B-B in each drop of wax.

Hold the end of the rod in a flame.

What happens? What does this show you about heat?

Heat travels through substances. We call this conduction (con DUK shun).



How Fast?

Does heat travel through different substances at the same speed?

Hold one end of a metal bar on a hot radiator. Does the end you are holding get hot?

Pile some cloth on a hot radiator. Does the cloth take very long to get hot?

Put a block of wood on the radiator. Does it get hot on top? Does it take very long?

Place a rock on the radiator. How long does it take to get hot?

Insulators

All substances carry heat. Do some substances conduct heat better than others?

Poor conductors of heat are called insulators (IN syoo LAY turs). Your mother usually uses a pot holder when she removes a pot from the fire. A pot holder is an insulator.

Look at the handles on an electric iron, on a frying pan, and on various pots. Are the handles good conductors or good insulators?

Why?

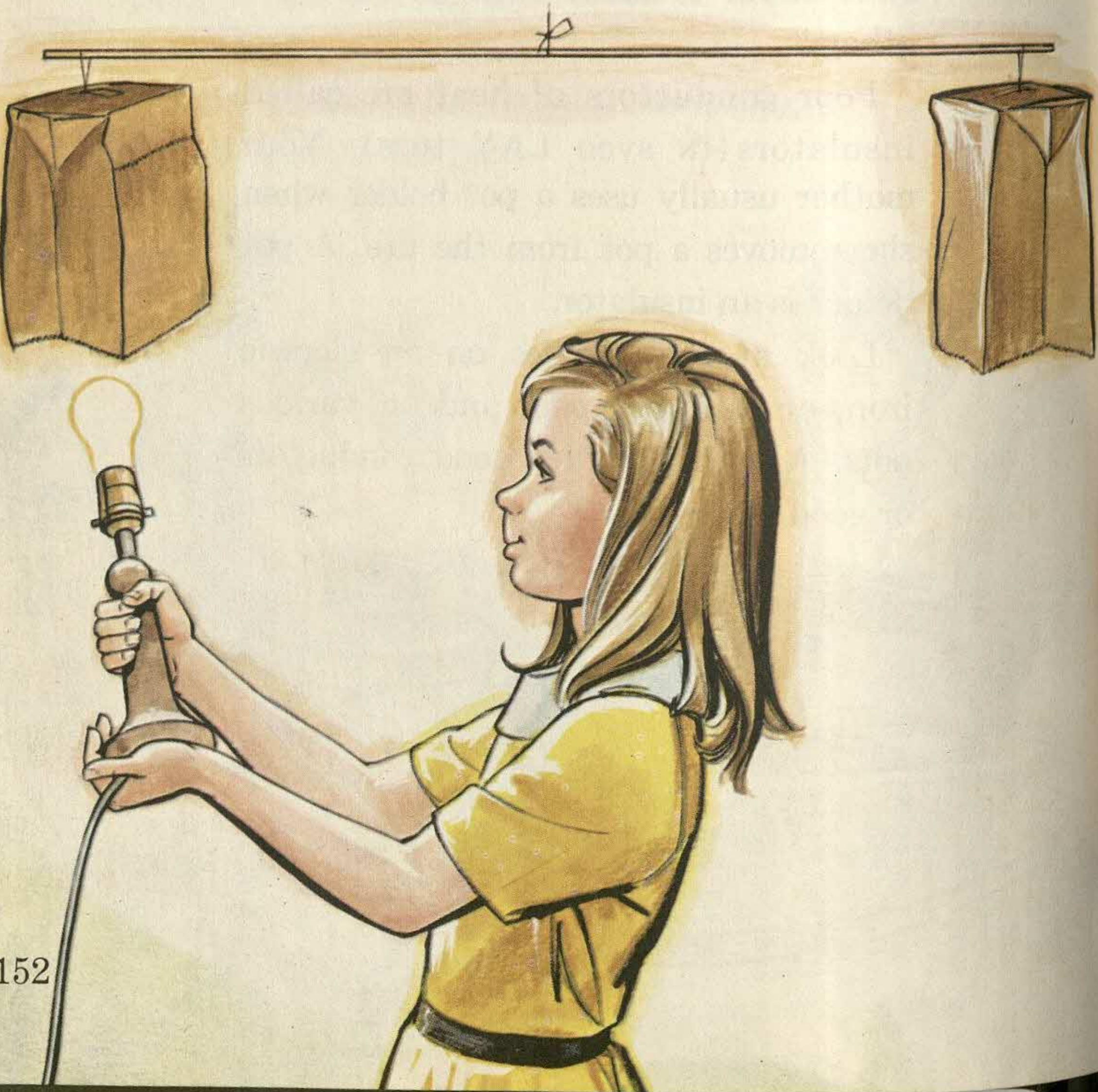
Attach two paper bags, opening downward, on each end of a yardstick.

Hang the yardstick so that it balances by a string.

Now carefully bring a light bulb near the opening of one bag.

What happens to the air when it is heated?

Why does the yardstick move?



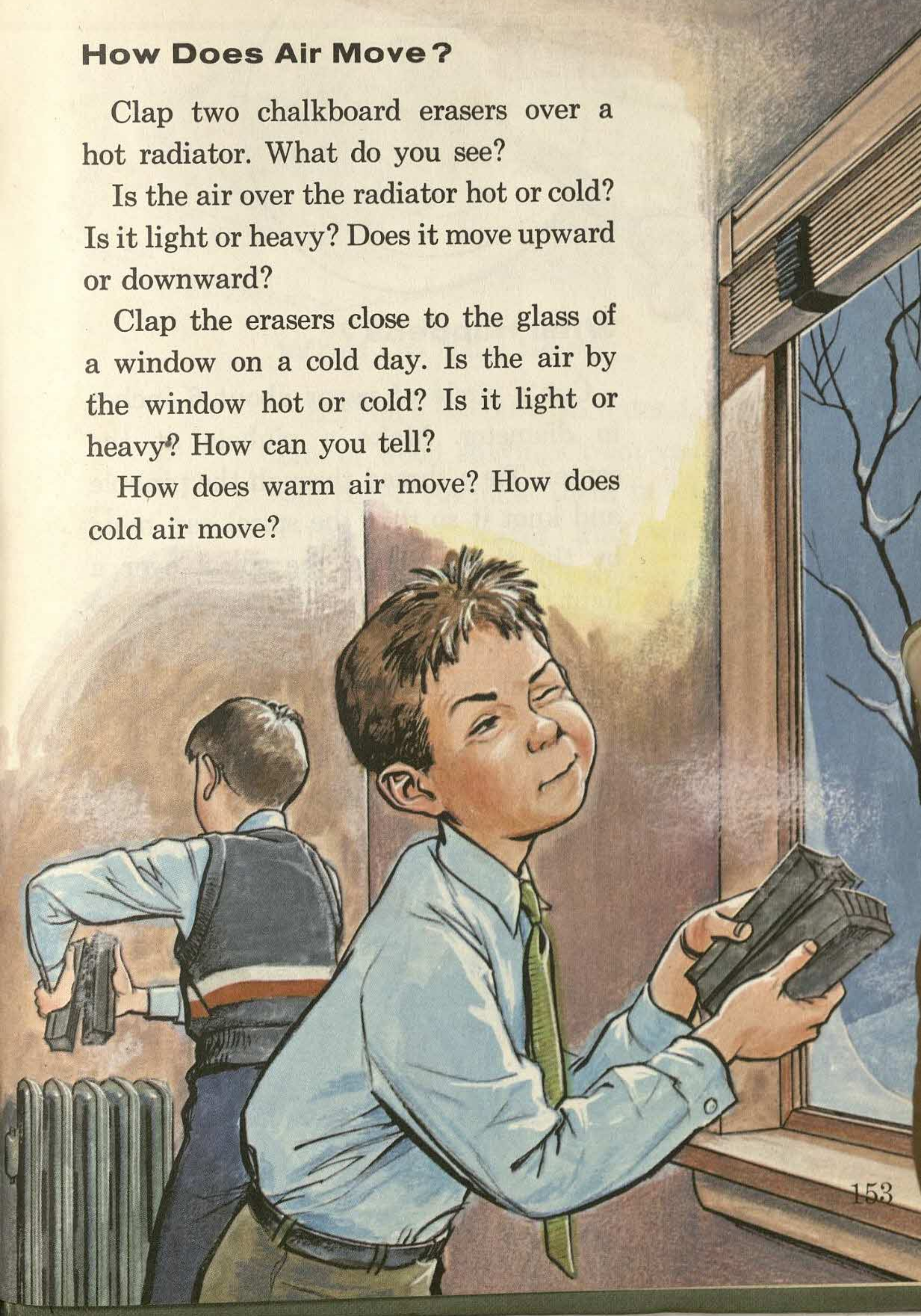
How Does Air Move?

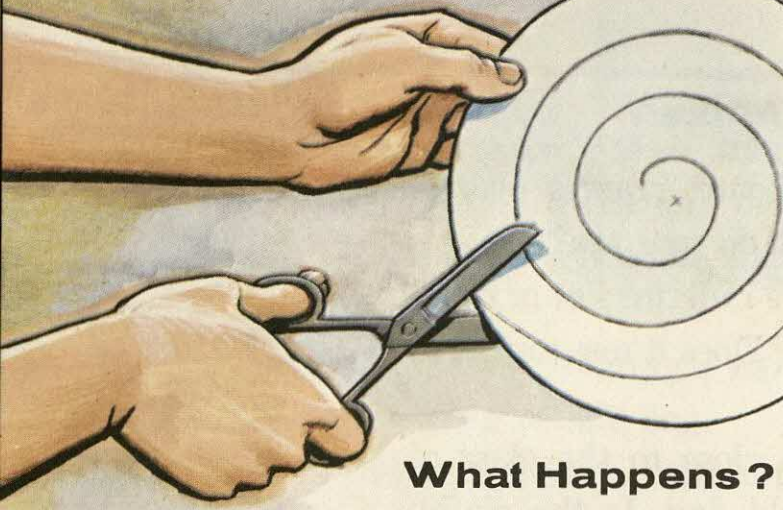
Clap two chalkboard erasers over a hot radiator. What do you see?

Is the air over the radiator hot or cold? Is it light or heavy? Does it move upward or downward?

Clap the erasers close to the glass of a window on a cold day. Is the air by the window hot or cold? Is it light or heavy? How can you tell?

How does warm air move? How does cold air move?

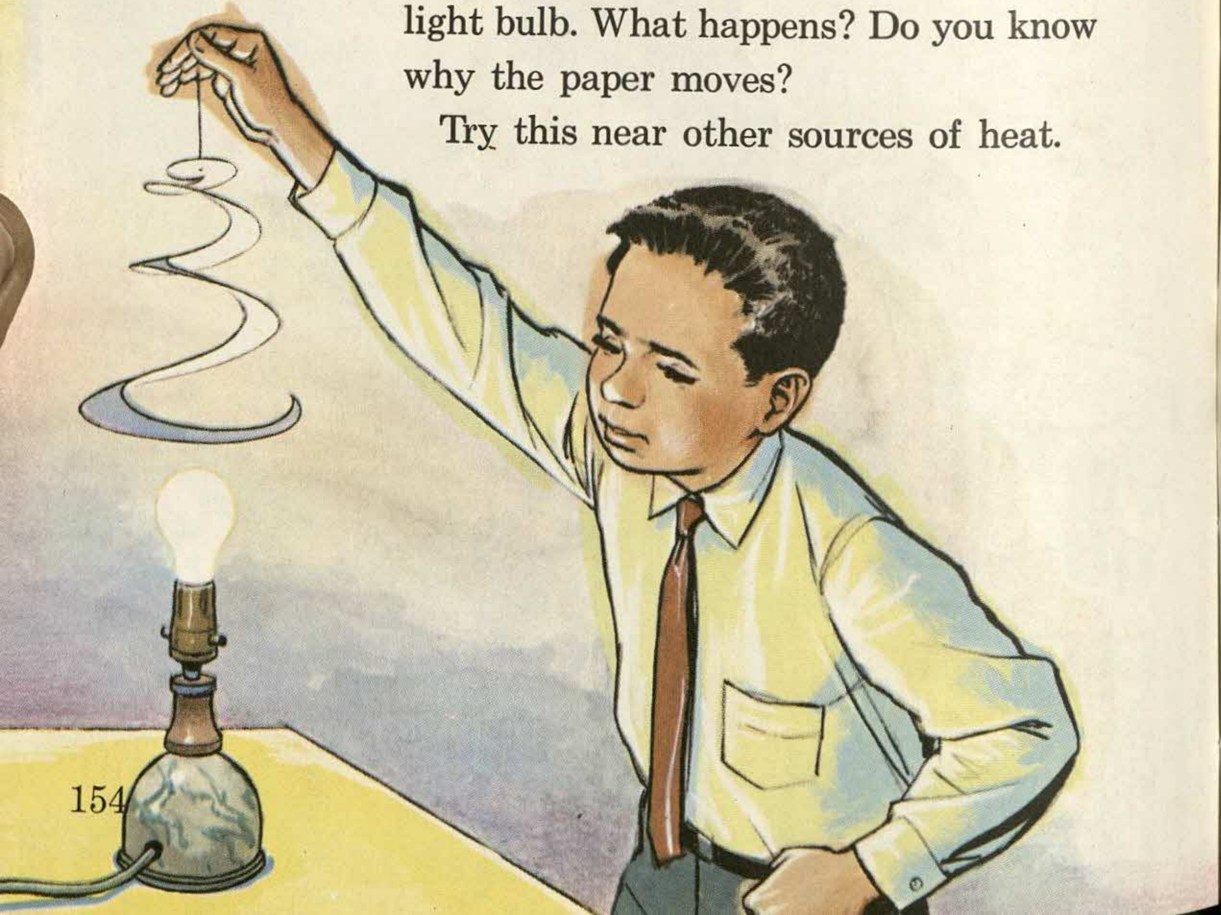




What Happens?

Cut a circle of paper about 6 inches in diameter. Make a pinhole at the center. Tie a thread through the pinhole and knot it so that the spiral can hang by the thread. Hold the spiral over a light bulb. What happens? Do you know why the paper moves?

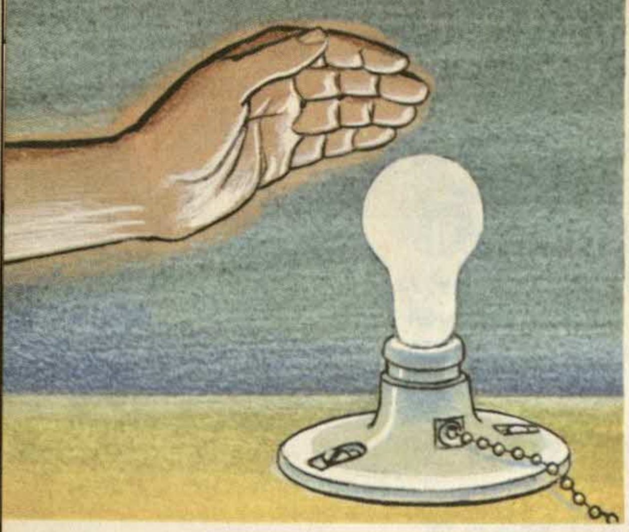
Try this near other sources of heat.



What Do You See?

Half fill a beaker with water. Get a few bits of wood shavings from your pencil sharpener. Sprinkle them in the water.

Heat the water and watch the movement of the small wooden shavings. Can you explain what you see?



Radiation

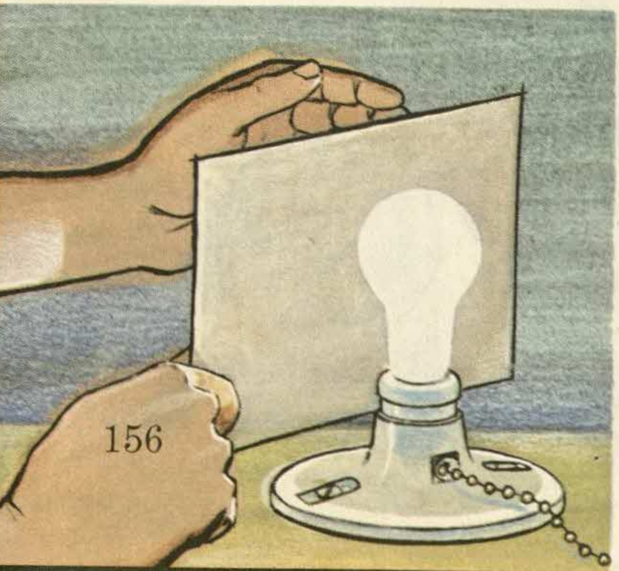
Turn on a light bulb. Put your hand near it, but do not touch it. What do you feel?

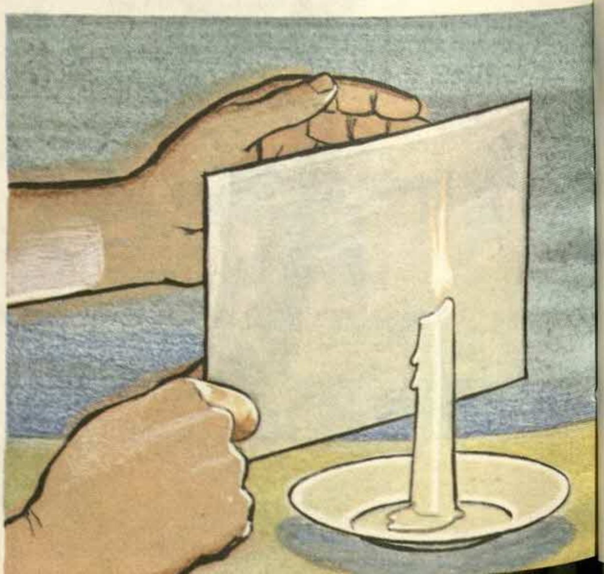
Put your hand near a lighted candle. What do you feel?

Heat that travels to you through space travels by radiation (ray dee AY shun).

Can you stop radiation?

Put a sheet of cardboard between your hand and the light bulb. Put the sheet between your hand and the candle flame. Do you still feel the heat?





Comparing Temperatures

Put a thermometer (A) on the ground in the sun. Put another thermometer (B) on the ground in the shade. Make a chart like the one below.

Take four readings of the temperature. Write down the time and the temperature each time. What have you discovered?

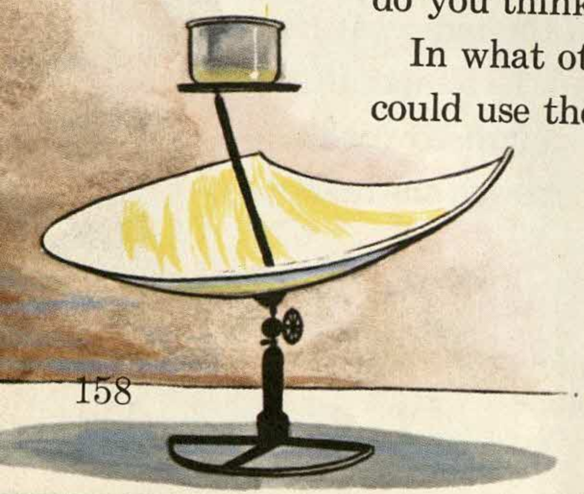
Which thermometer showed the higher reading? Why?

How Do We Use The Sun's Heat?

Put a small piece of tissue paper on a plate in the sunlight. Hold a magnifying glass in the sunlight over the paper so that all the sunlight comes to a point on the paper. What happens after a while at that point? Why?

In India and Japan, solar cookers are being tried. Large mirrors collect the sunlight and shine it to one place. Where do you think the food is put?

In what other ways do you think man could use the sun's heat?



What Do You Think?

How does heat help us?

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